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(54) **SYSTEMS FOR INTERACTION WITH EXERCISE DEVICE**

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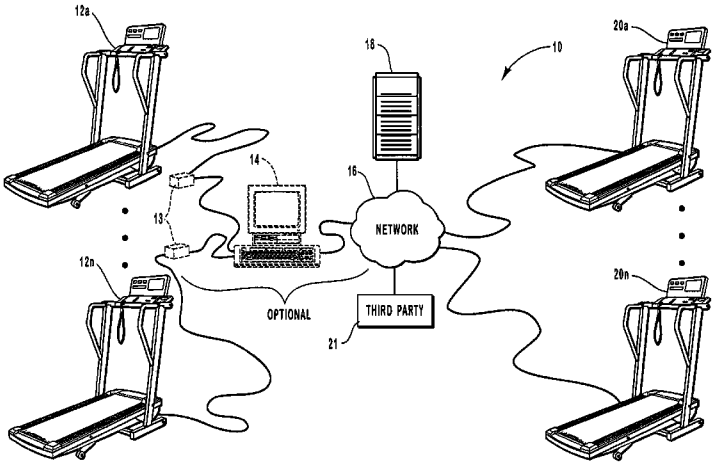
(57) **ABSTRACT**

An exercise device is configured to enable a user to interact with a trainer in real-time communication. The exercise device includes an exercise mechanism having a movable element for movement in performance of exercise by a user. Communicating with the exercise mechanism is an interface adapted for gathering a first real-time signal from the user. The interface communicates with a communication system for receiving a packetized second real-time signal including a synchronized control signal from the trainer. The exercise device includes an output device configured to reproduce the second real-time signal. The control signals carried by the second signal are used to control the operating parameters of the exercise mechanism in real-time.

22 Claims, 20 Drawing Sheets



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Notice of Allowance and Fee(s) Due, date mailed Jul. 6, 2006, 4 pages, U.S. Appl. No. 10/773,617.
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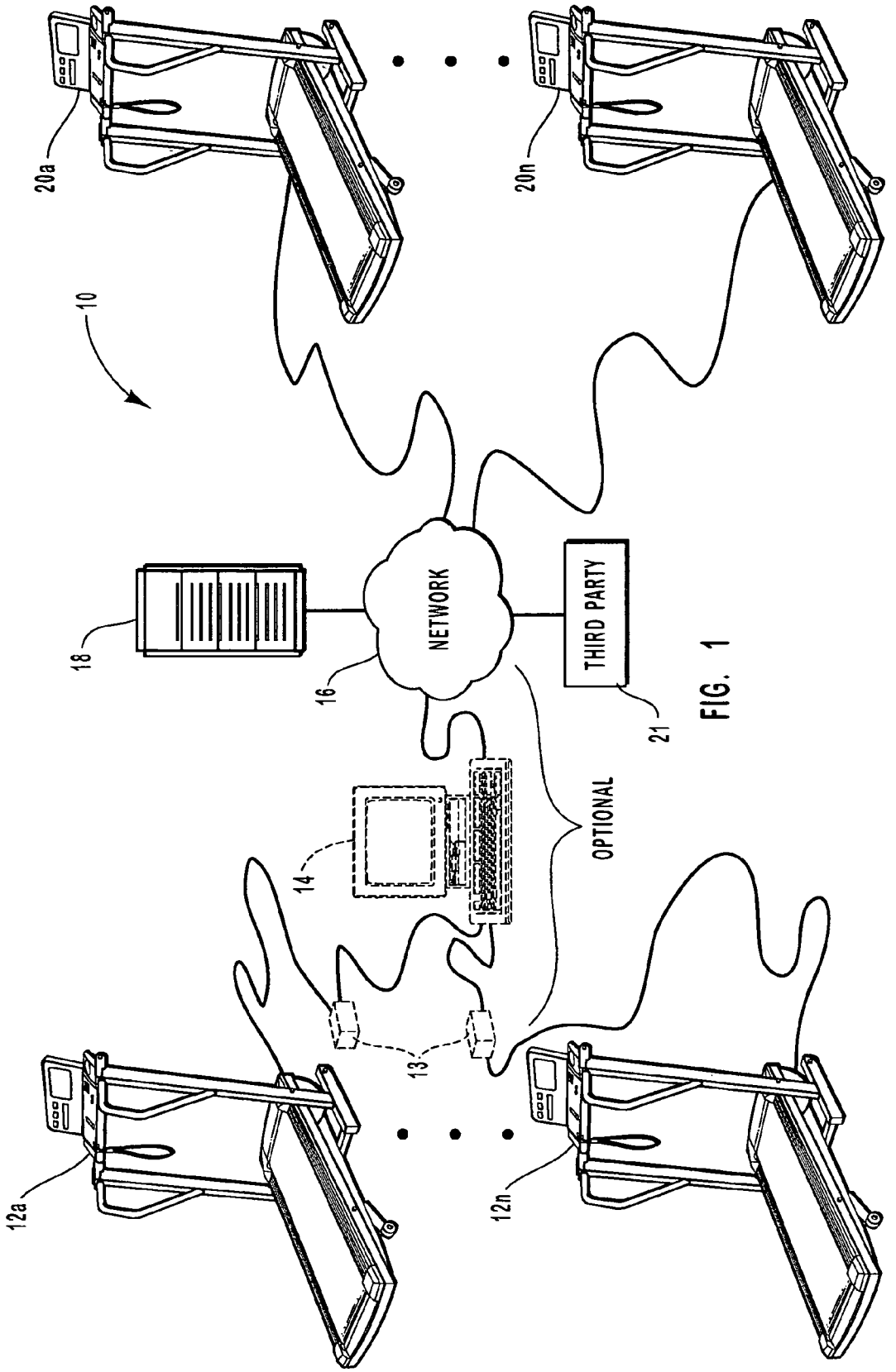

FIG. 1

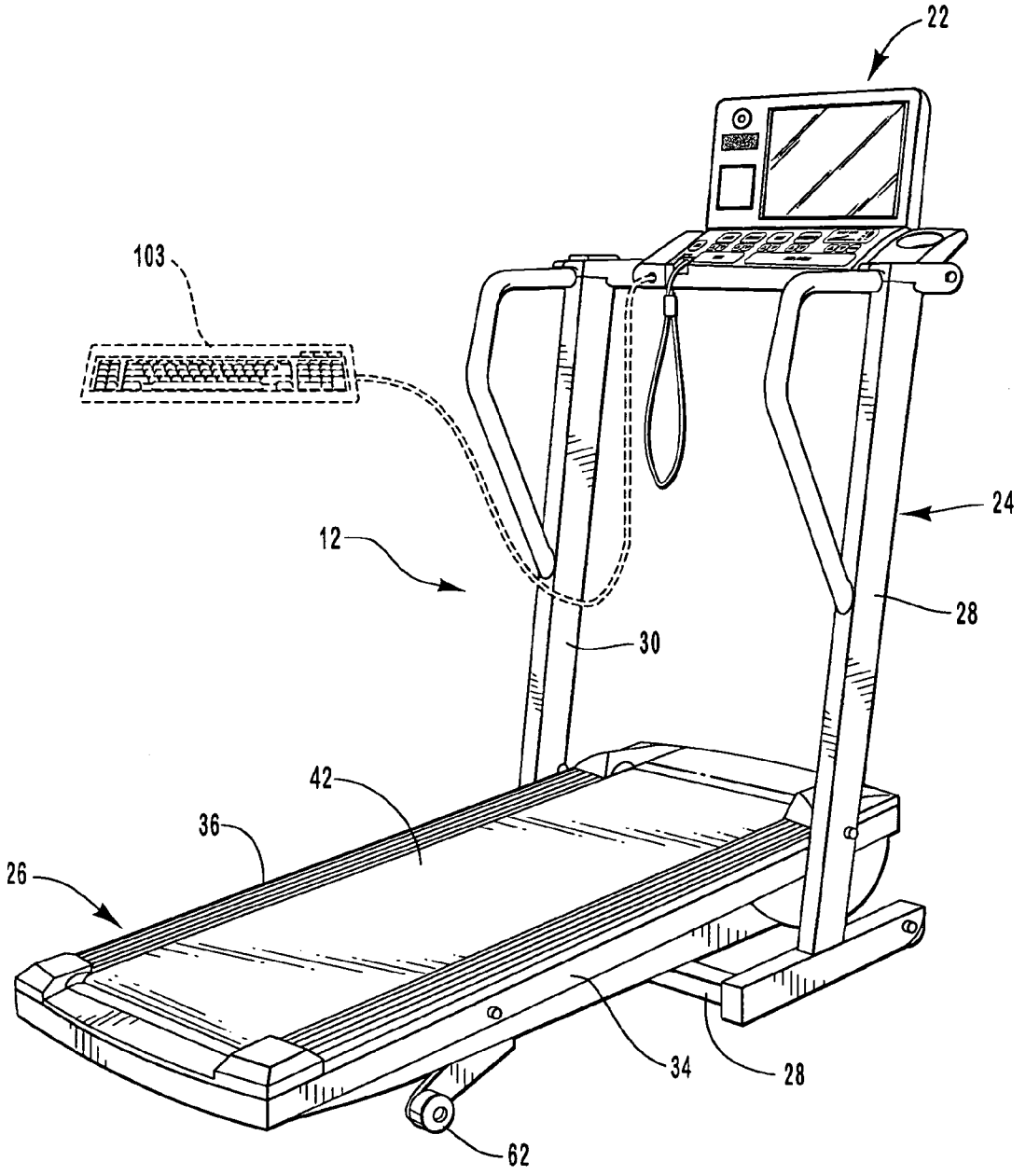

FIG. 2

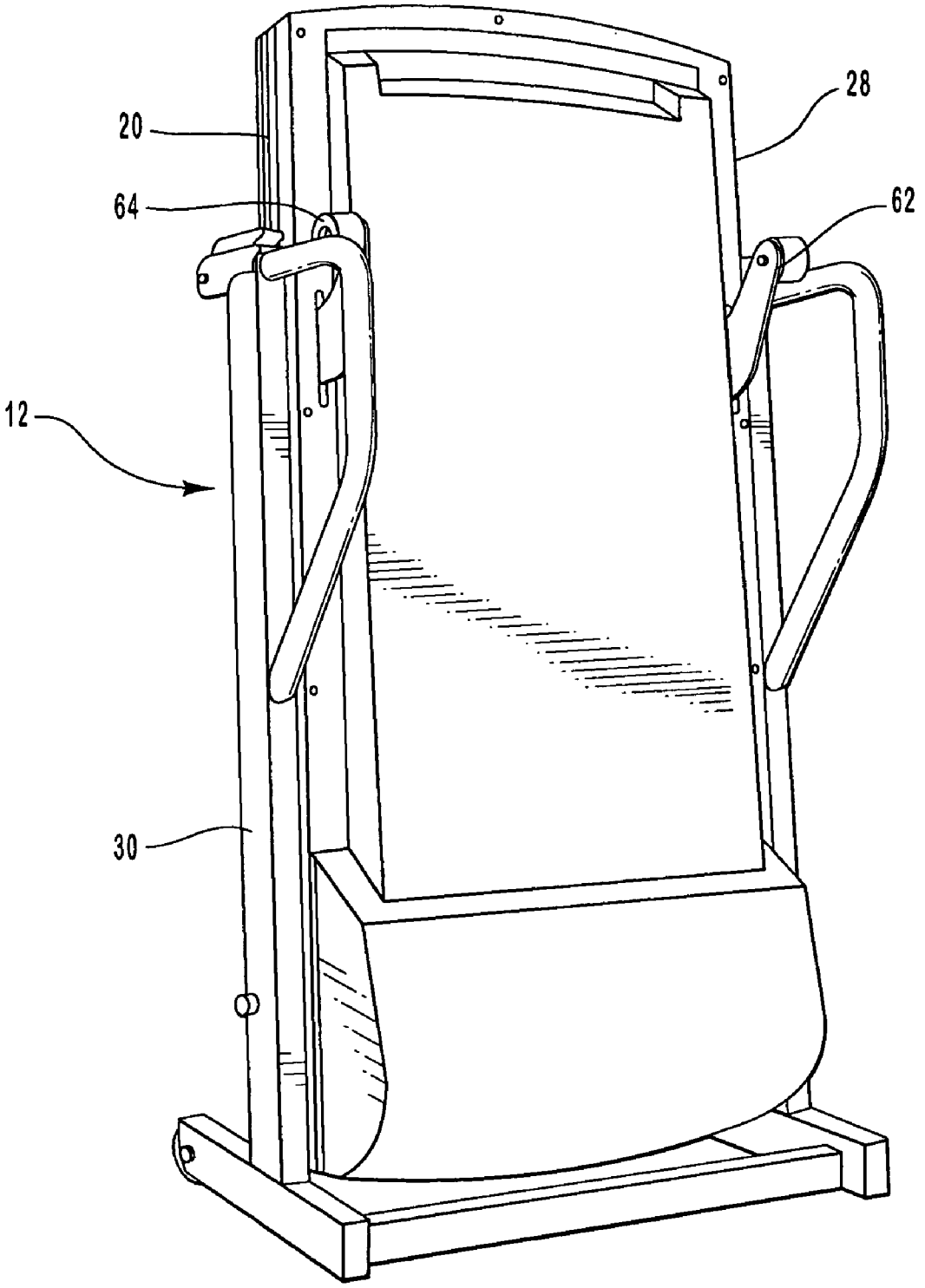

FIG. 3

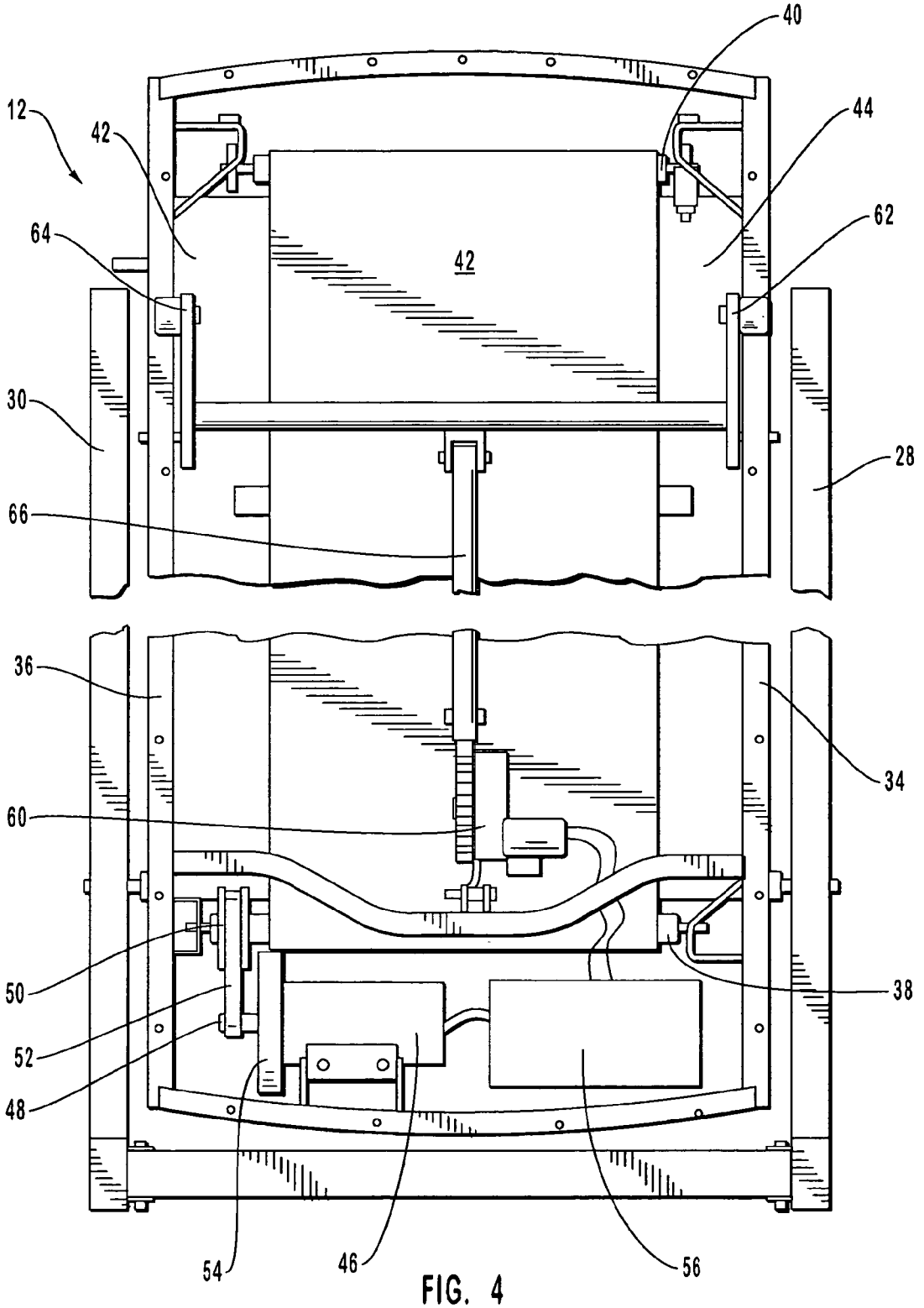

FIG. 4

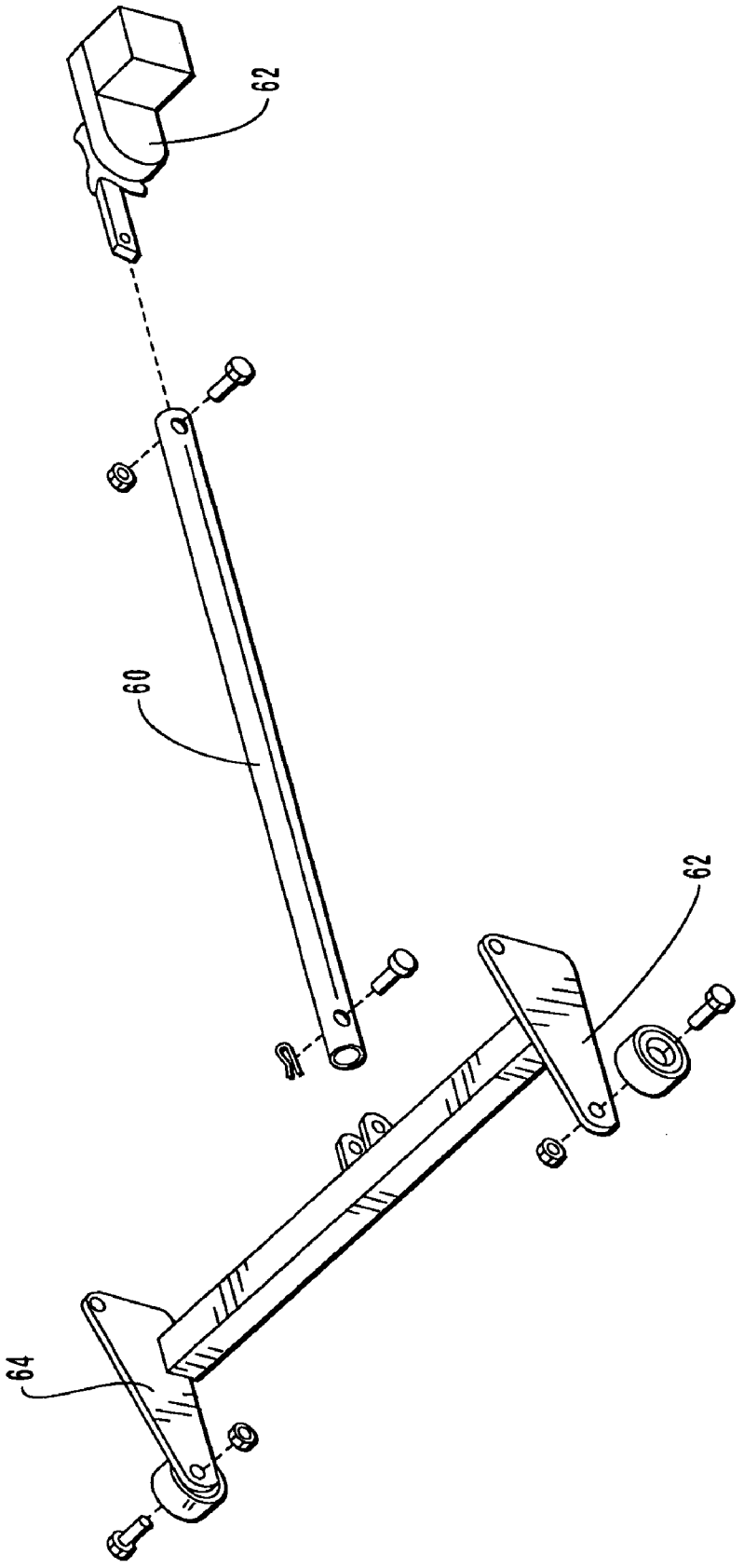

FIG. 5

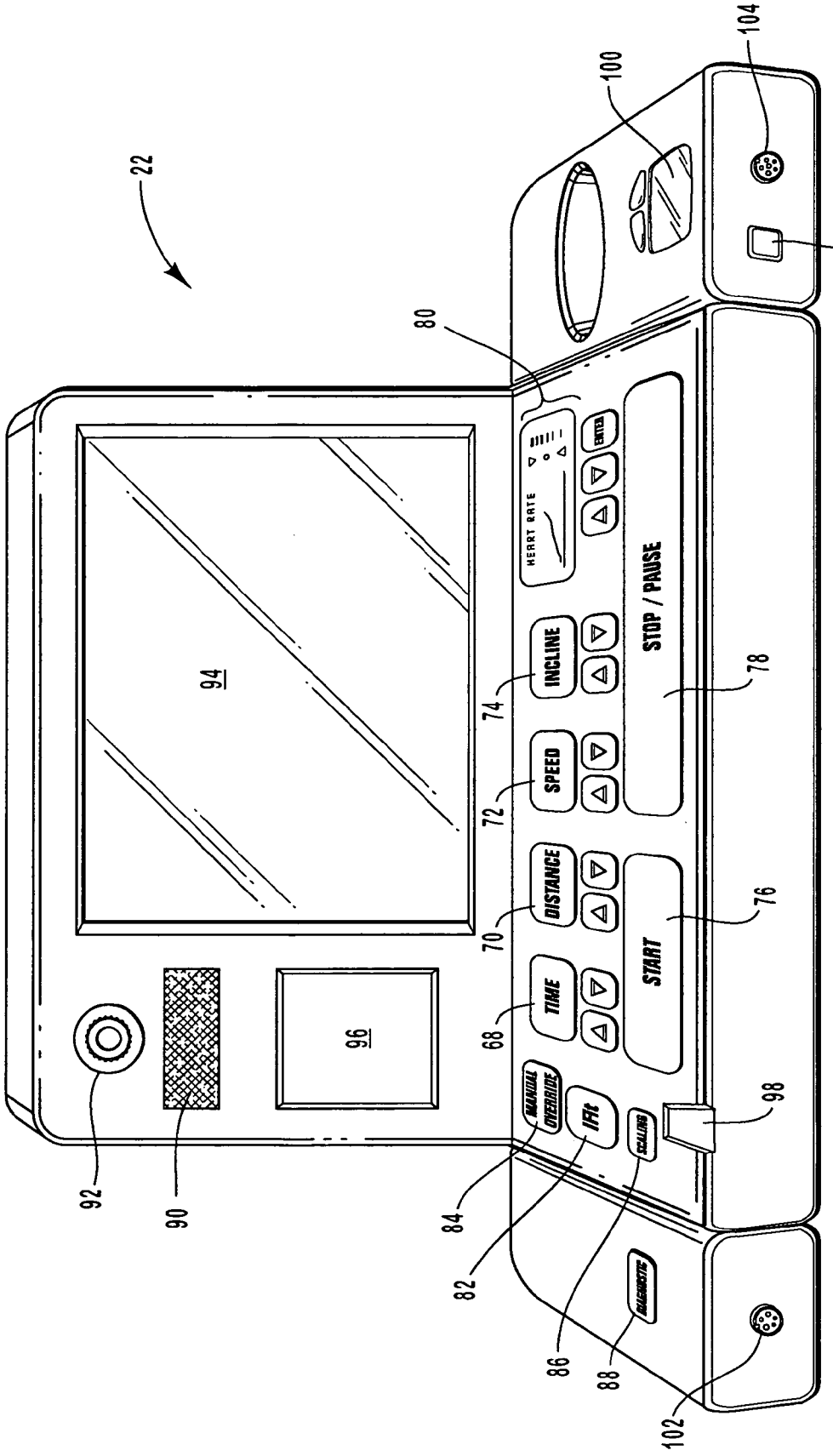
22
80
100
104
105
94
96
92
90
84
82
86
88
102
98
HEART RATE
INCLINE
SPEED
DISTANCE
TIME
STOP / PAUSE
START
74
72
70
68
78
76
MANUAL OVERRIDE
IFit
SCALING
BLUETOOTH

FIG. 6

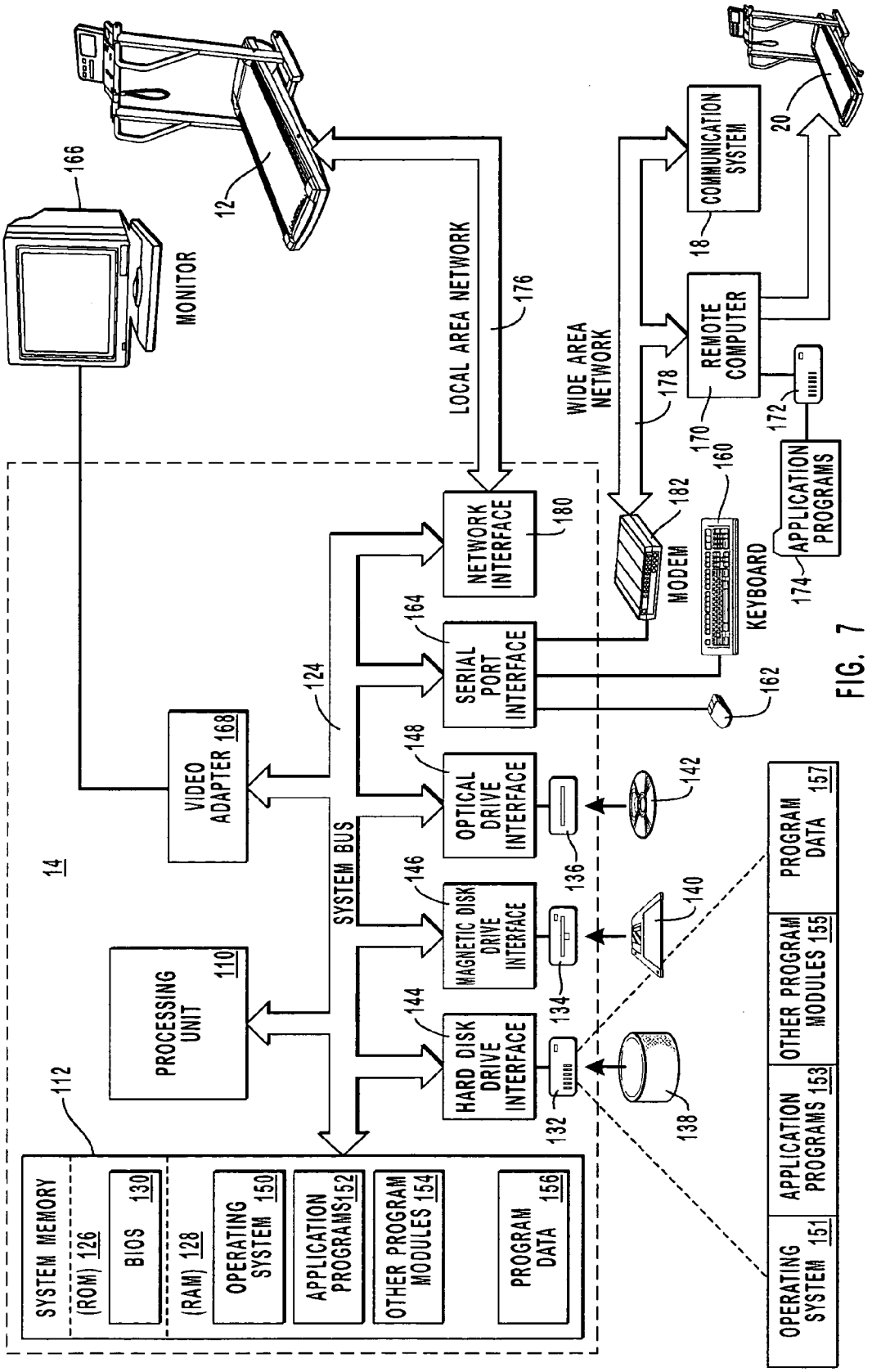
MONITOR
166
12
LOCAL AREA NETWORK
176
WIDE AREA NETWORK
COMMUNICATION SYSTEM
18
20
REMOTE COMPUTER
178
170
172
APPLICATION PROGRAMS
174
MODEM
182
KEYBOARD
160
162
NETWORK INTERFACE
180
SERIAL PORT INTERFACE
164
OPTICAL DRIVE INTERFACE
148
MAGNETIC DISK DRIVE INTERFACE
146
HARD DISK DRIVE INTERFACE
144
VIDEO ADAPTER 168
124
SYSTEM BUS
14
PROCESSING UNIT 110
112
SYSTEM MEMORY
(ROM) 126
BIOS 130
(RAM) 128
OPERATING SYSTEM 150
APPLICATION PROGRAMS 152
OTHER PROGRAM MODULES 154
PROGRAM DATA 156
132
134
136
138
140
142
OPERATING SYSTEM 151
APPLICATION PROGRAMS 153
OTHER PROGRAM MODULES 155
PROGRAM DATA 157

FIG. 7

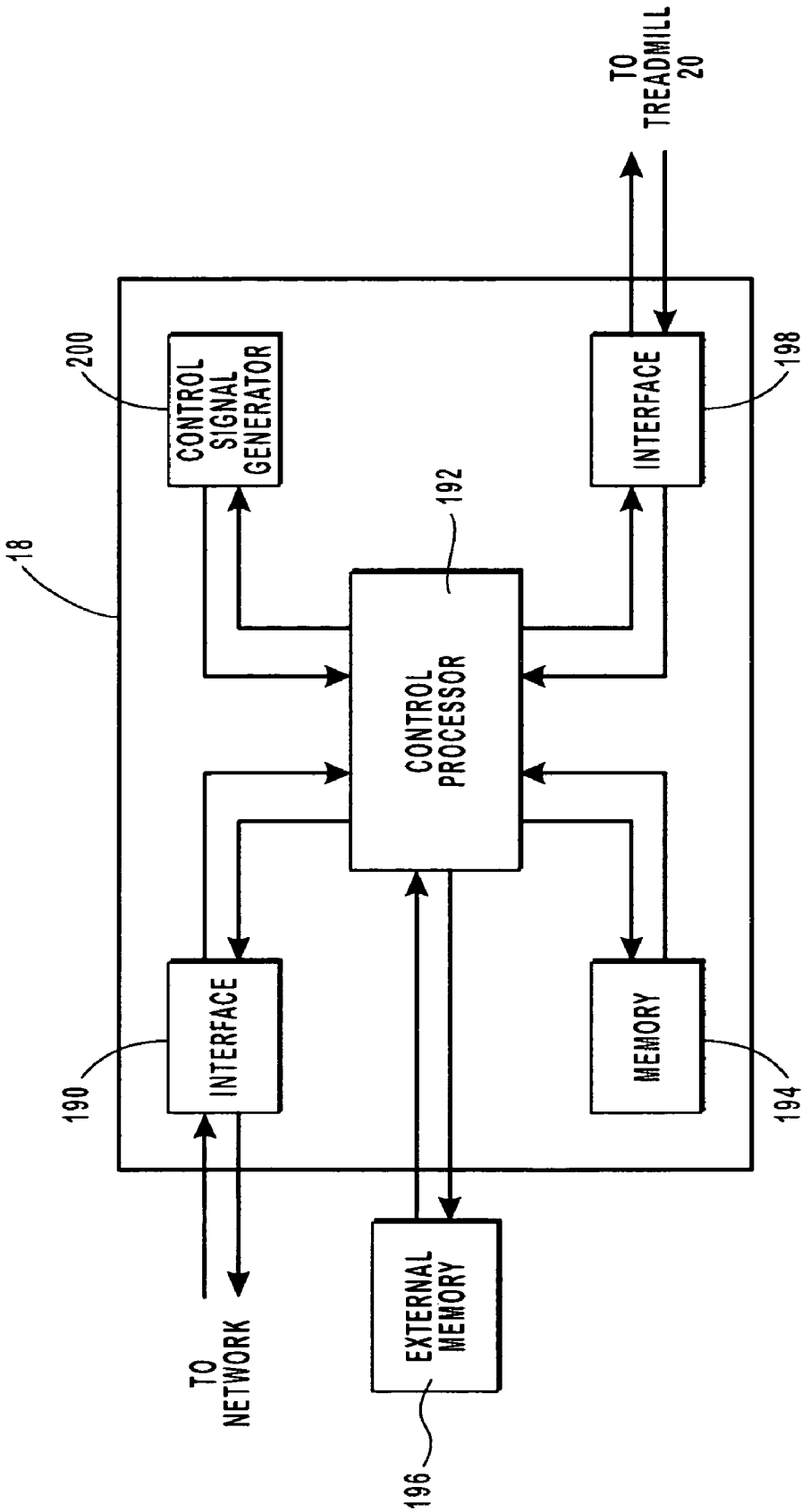
TO TREADMILL 20
200
CONTROL SIGNAL GENERATOR
198
INTERFACE
18
192
CONTROL PROCESSOR
INTERFACE
190
MEMORY
194
TO NETWORK
EXTERNAL MEMORY
196

FIG. 8

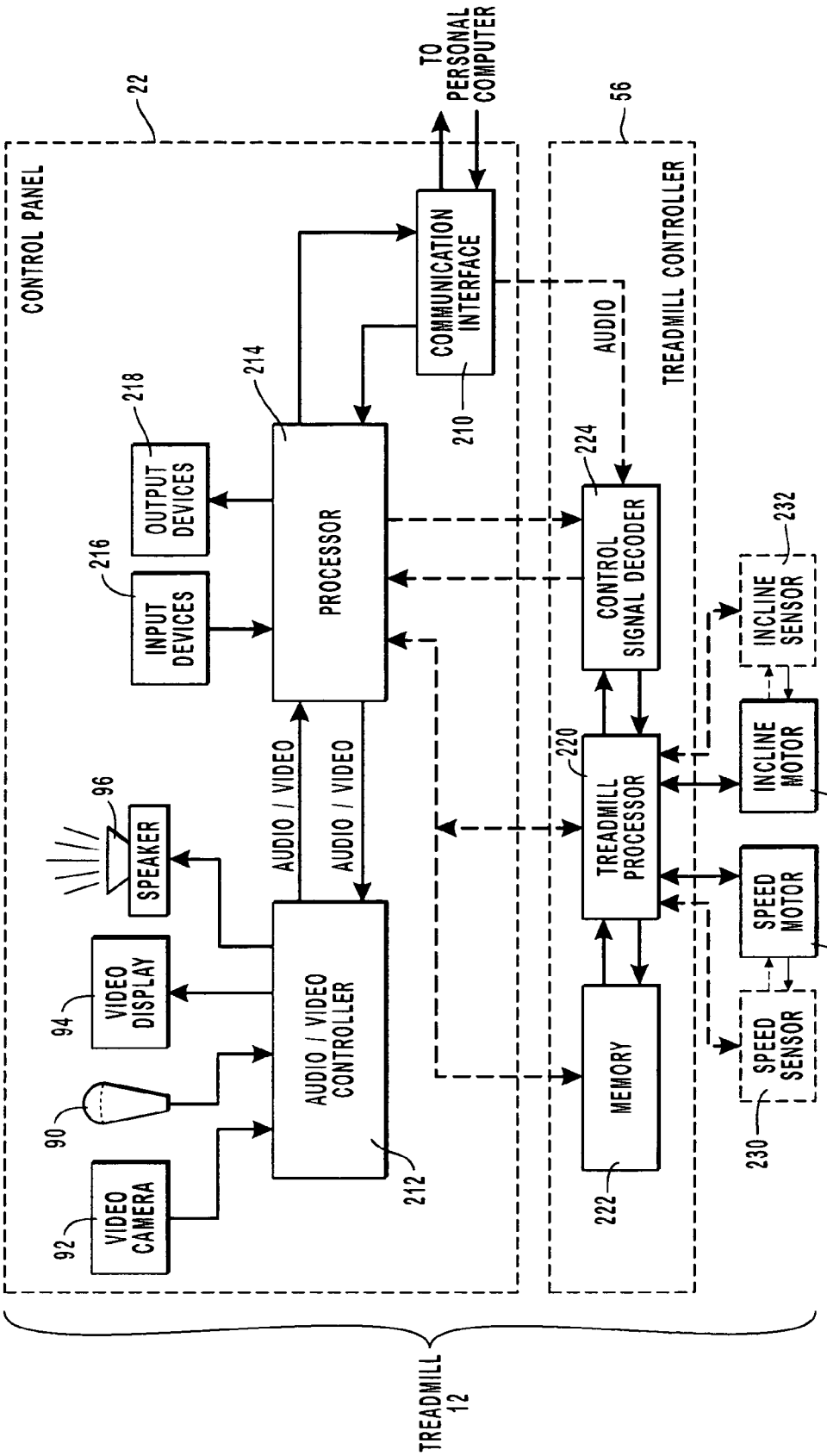
TREADMILL 12
CONTROL PANEL
22
TREADMILL CONTROLLER
56
TO PERSONAL COMPUTER
COMMUNICATION INTERFACE
210
AUDIO
PROCESSOR
214
OUTPUT DEVICES
218
INPUT DEVICES
216
CONTROL SIGNAL DECODER
224
INCLINE SENSOR
232
INCLINE MOTOR
228
TREADMILL PROCESSOR
220
SPEED MOTOR
226
SPEED SENSOR
230
MEMORY
222
AUDIO / VIDEO
AUDIO / VIDEO
AUDIO / VIDEO CONTROLLER
212
SPEAKER
96
VIDEO DISPLAY
94
VIDEO CAMERA
92
90

FIG. 9

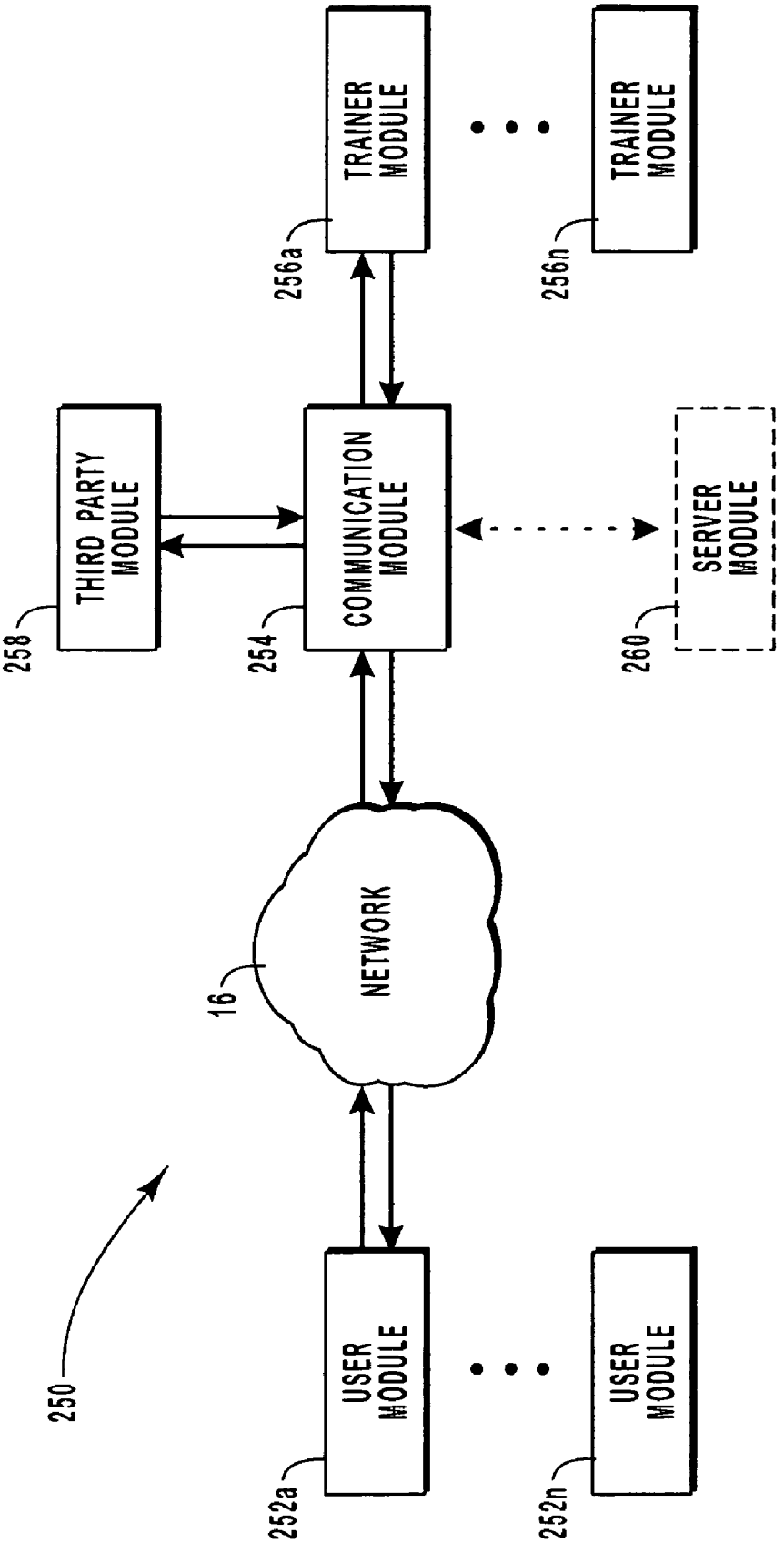
TRAINER MODULE
TRAINER MODULE
256a
256n
THIRD PARTY MODULE
COMMUNICATION MODULE
SERVER MODULE
258
254
260
NETWORK
16
250
USER MODULE
USER MODULE
252a
252n

FIG. 10

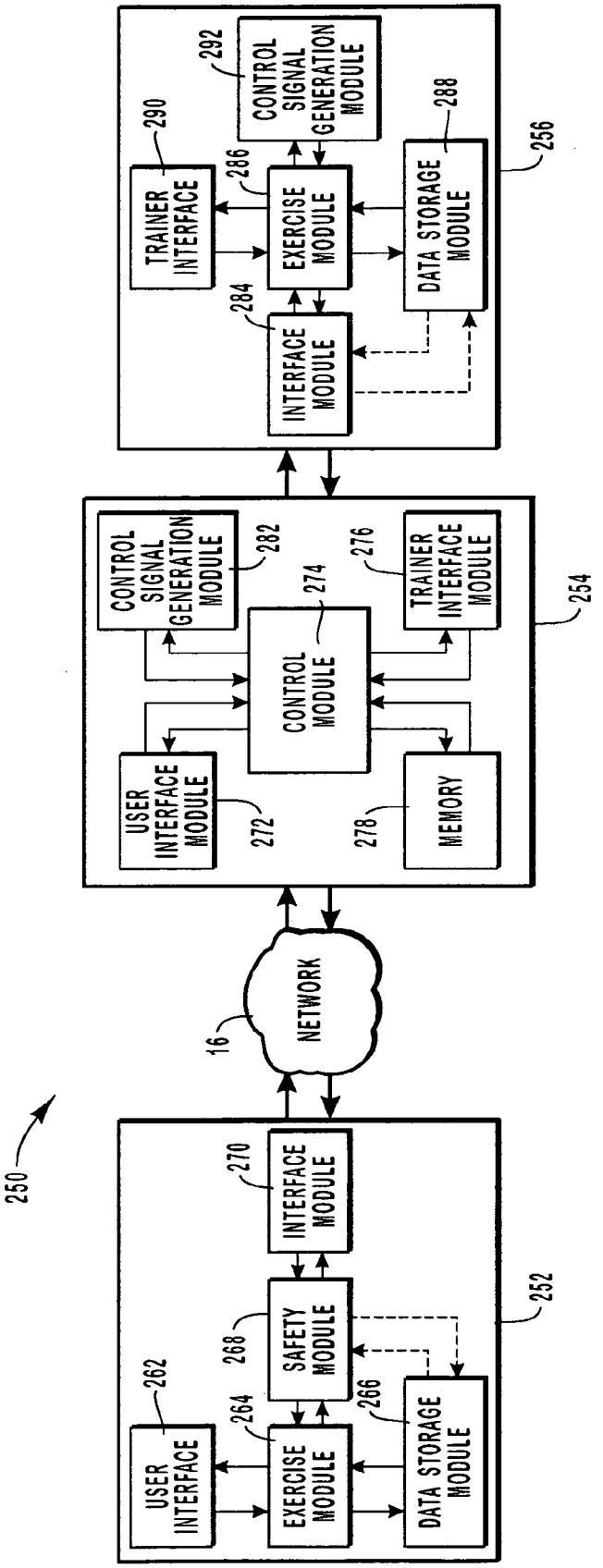
250
252
USER INTERFACE
262
264
EXERCISE MODULE
SAFETY MODULE
268
INTERFACE MODULE
270
DATA STORAGE MODULE
266
16
NETWORK
254
USER INTERFACE MODULE
272
CONTROL MODULE
274
CONTROL SIGNAL GENERATION MODULE
282
TRAINER INTERFACE MODULE
276
MEMORY
278
256
TRAINER INTERFACE
290
EXERCISE MODULE
286
INTERFACE MODULE
284
CONTROL SIGNAL GENERATION MODULE
292
DATA STORAGE MODULE
288

FIG. 11

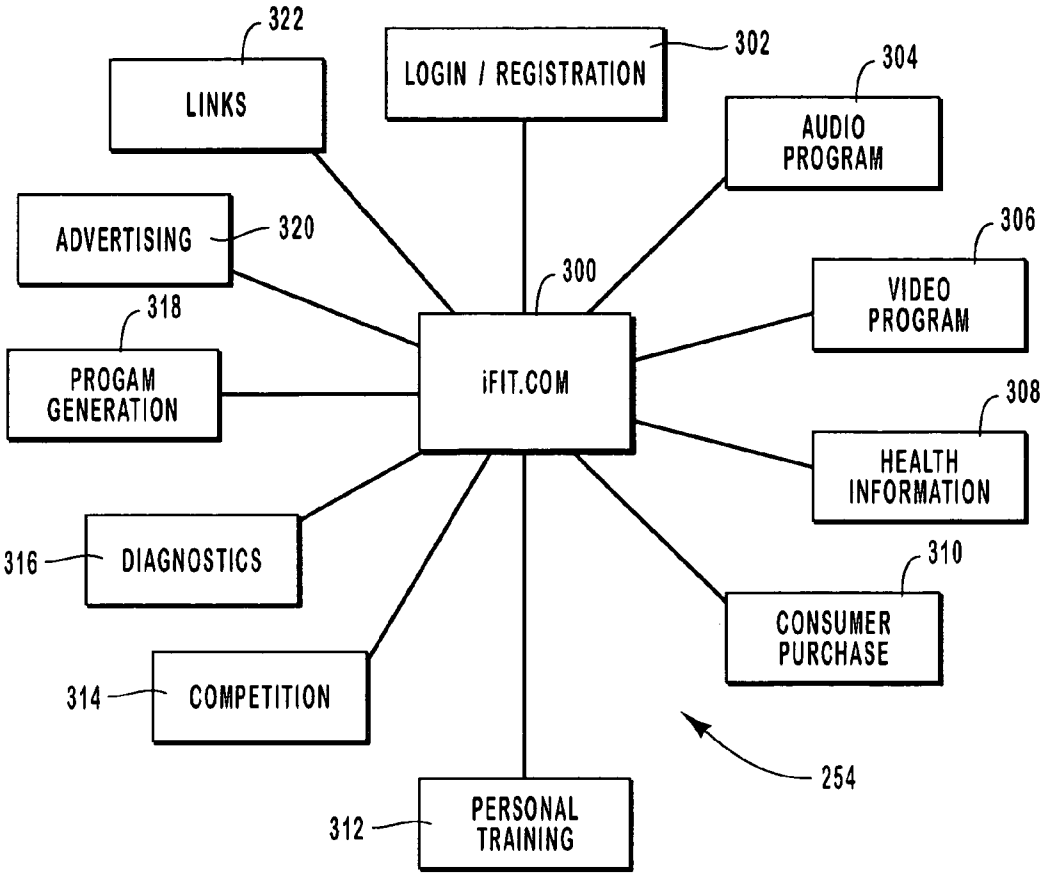
322
LINKS
LOGIN / REGISTRATION
302
304
AUDIO PROGRAM
ADVERTISING
320
306
VIDEO PROGRAM
300
318
PROGAM GENERATION
iFIT.COM
308
HEALTH INFORMATION
316
DIAGNOSTICS
310
CONSUMER PURCHASE
314
COMPETITION
254
312
PERSONAL TRAINING

FIG. 12

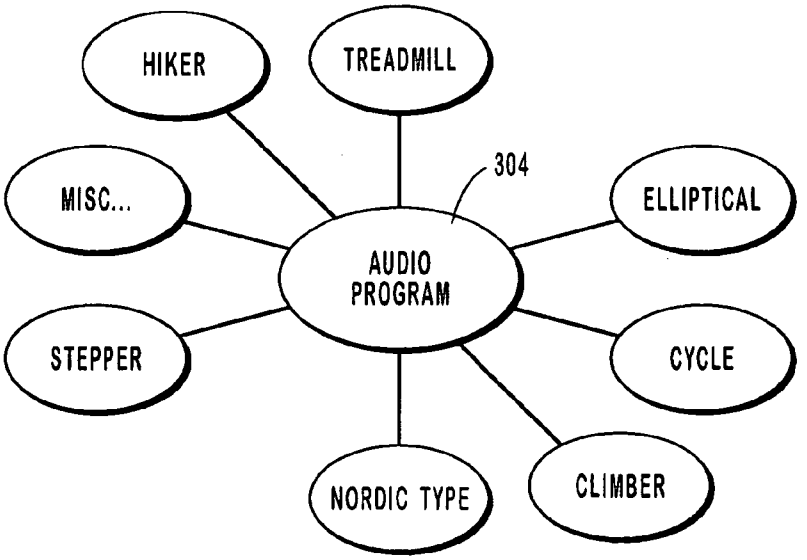
HIKER
TREADMILL
304
MISC...
ELLIPTICAL
AUDIO PROGRAM
STEPPER
CYCLE
NORDIC TYPE
CLIMBER

FIG. 14

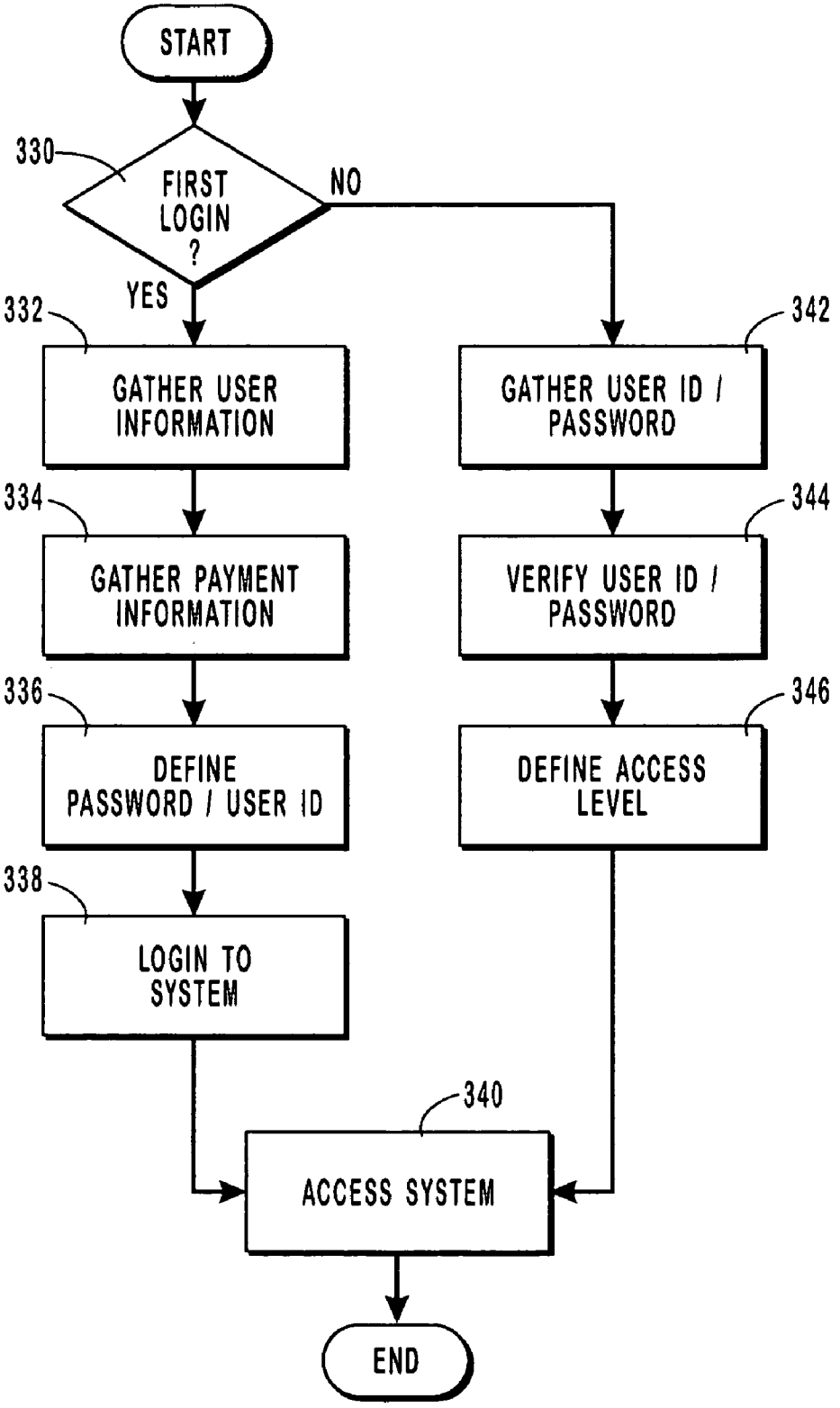
START
330
FIRST LOGIN ?
NO
YES
332
GATHER USER INFORMATION
334
GATHER PAYMENT INFORMATION
336
DEFINE PASSWORD / USER ID
338
LOGIN TO SYSTEM
342
GATHER USER ID / PASSWORD
344
VERIFY USER ID / PASSWORD
346
DEFINE ACCESS LEVEL
340
ACCESS SYSTEM
END

FIG. 13

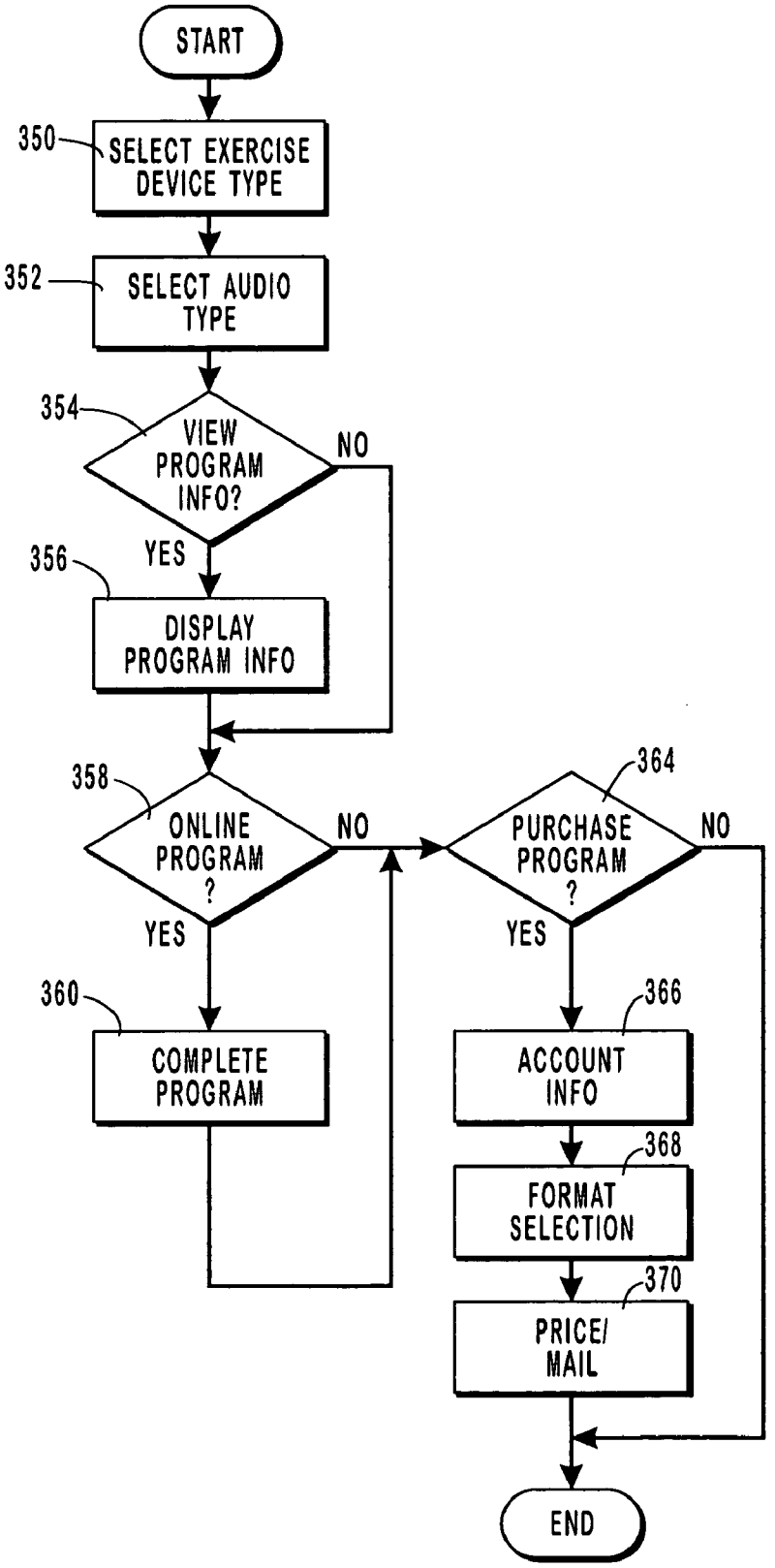
START
350
SELECT EXERCISE DEVICE TYPE
352
SELECT AUDIO TYPE
354
VIEW PROGRAM INFO?
NO
YES
356
DISPLAY PROGRAM INFO
358
ONLINE PROGRAM ?
NO
YES
360
COMPLETE PROGRAM
364
PURCHASE PROGRAM ?
NO
YES
366
ACCOUNT INFO
368
FORMAT SELECTION
370
PRICE/ MAIL
END

FIG. 15

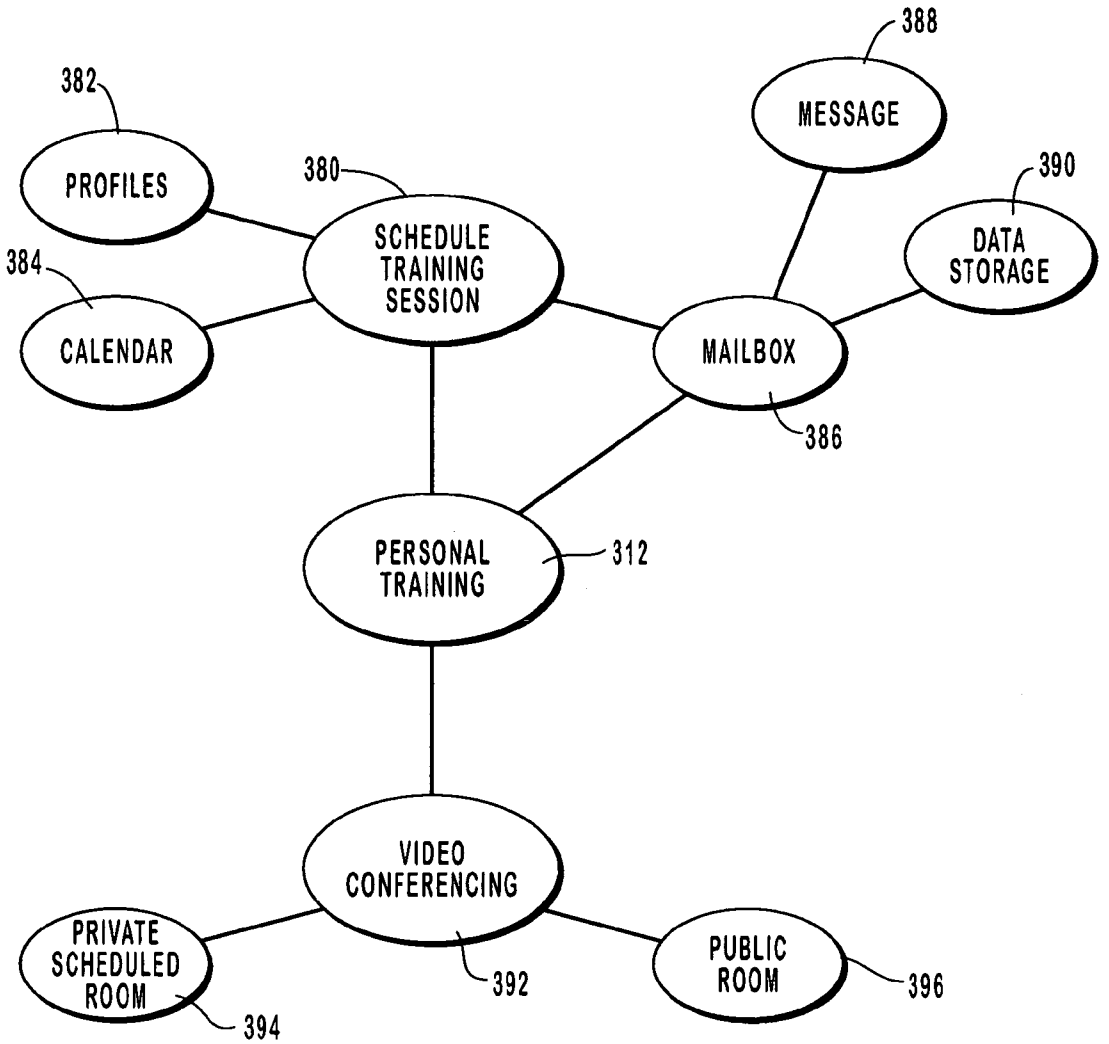
382
PROFILES
380
SCHEDULE TRAINING SESSION
384
CALENDAR
388
MESSAGE
390
DATA STORAGE
MAILBOX
386
PERSONAL TRAINING
312
VIDEO CONFERENCING
PRIVATE SCHEDULED ROOM
394
392
PUBLIC ROOM
396

FIG. 16

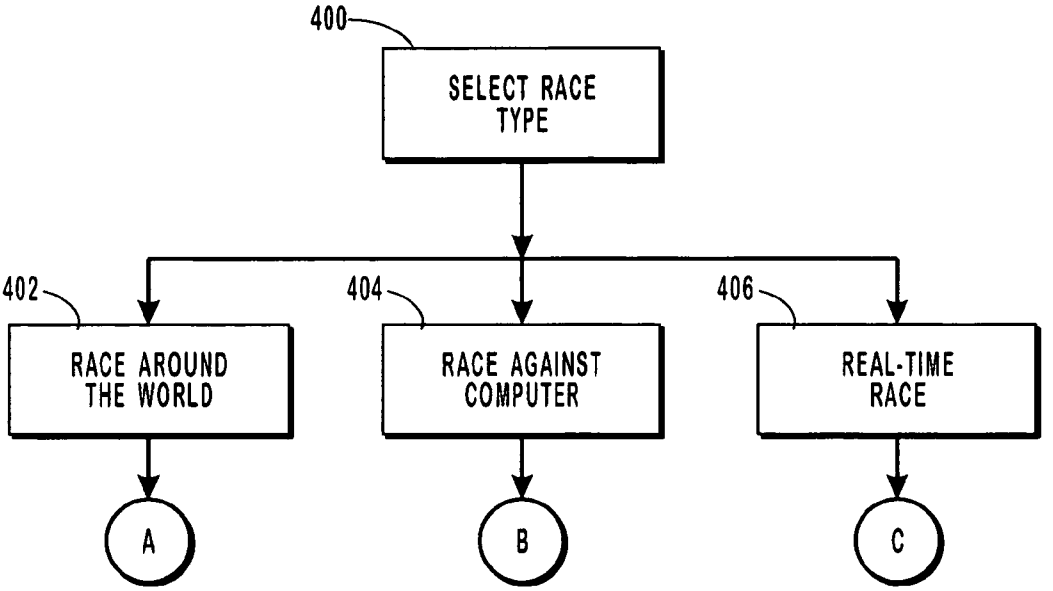

FIG. 17A

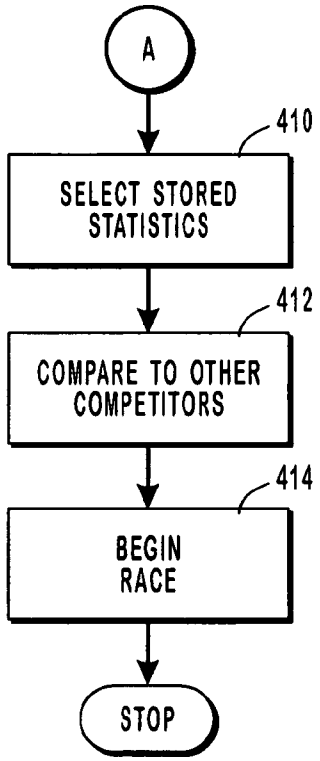

FIG. 17B

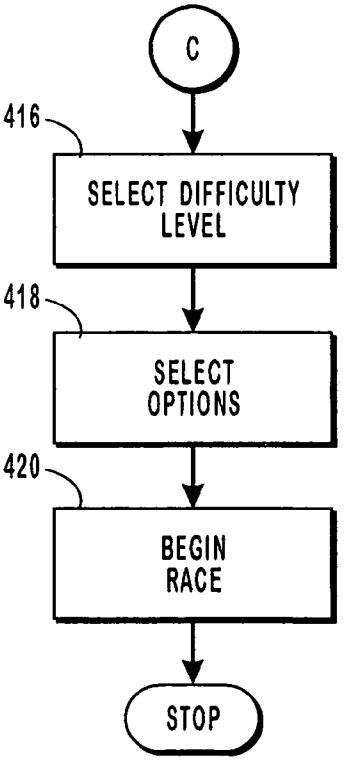

FIG. 17C

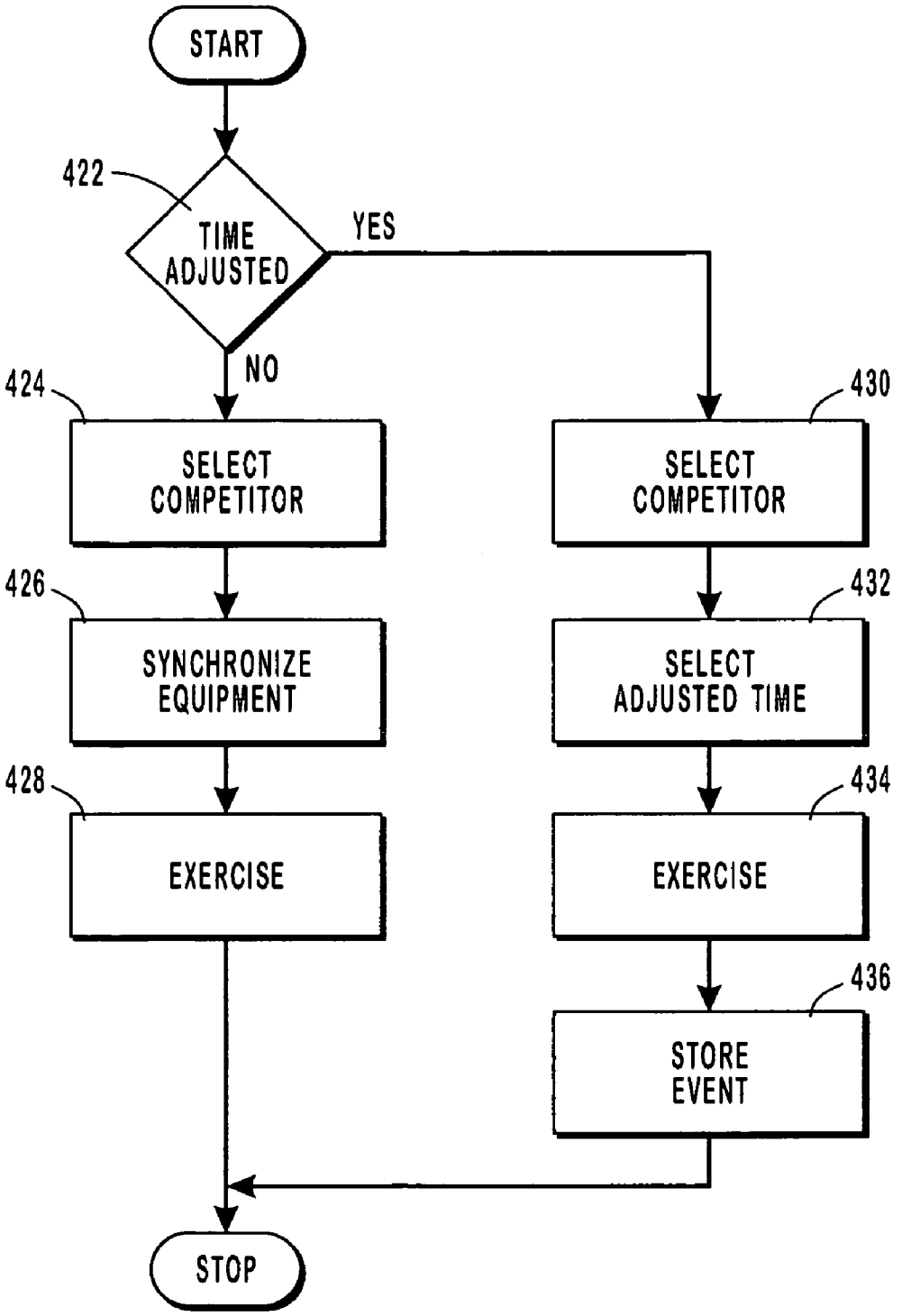
START
422
TIME ADJUSTED
YES
NO
424
SELECT COMPETITOR
426
SYNCHRONIZE EQUIPMENT
428
EXERCISE
430
SELECT COMPETITOR
432
SELECT ADJUSTED TIME
434
EXERCISE
436
STORE EVENT
STOP

FIG. 17D

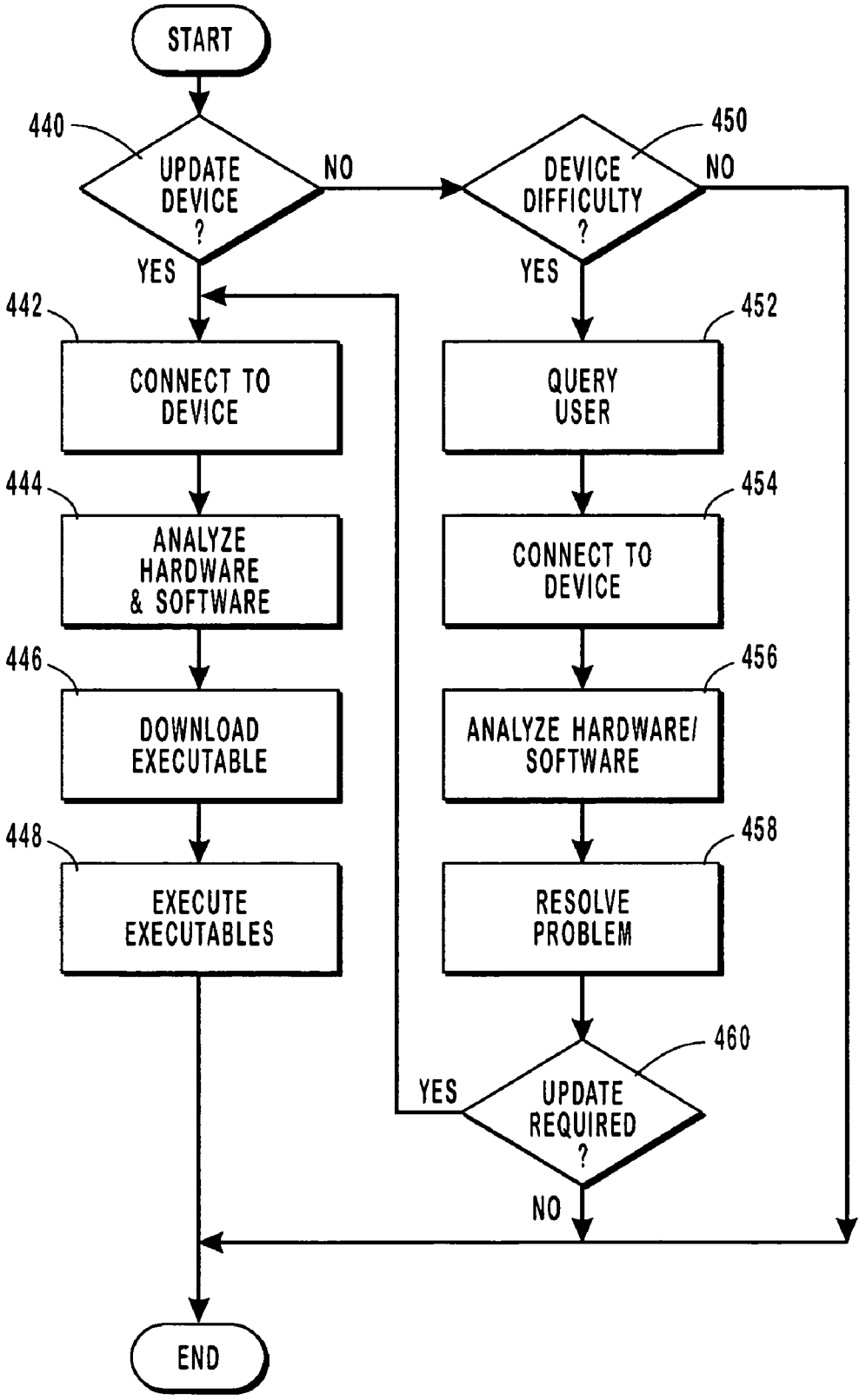
START
440
UPDATE DEVICE ?
NO
YES
450
DEVICE DIFFICULTY ?
NO
YES
442
CONNECT TO DEVICE
444
ANALYZE HARDWARE & SOFTWARE
446
DOWNLOAD EXECUTABLE
448
EXECUTE EXECUTABLES
452
QUERY USER
454
CONNECT TO DEVICE
456
ANALYZE HARDWARE/ SOFTWARE
458
RESOLVE PROBLEM
460
YES
UPDATE REQUIRED ?
NO
END

FIG. 18

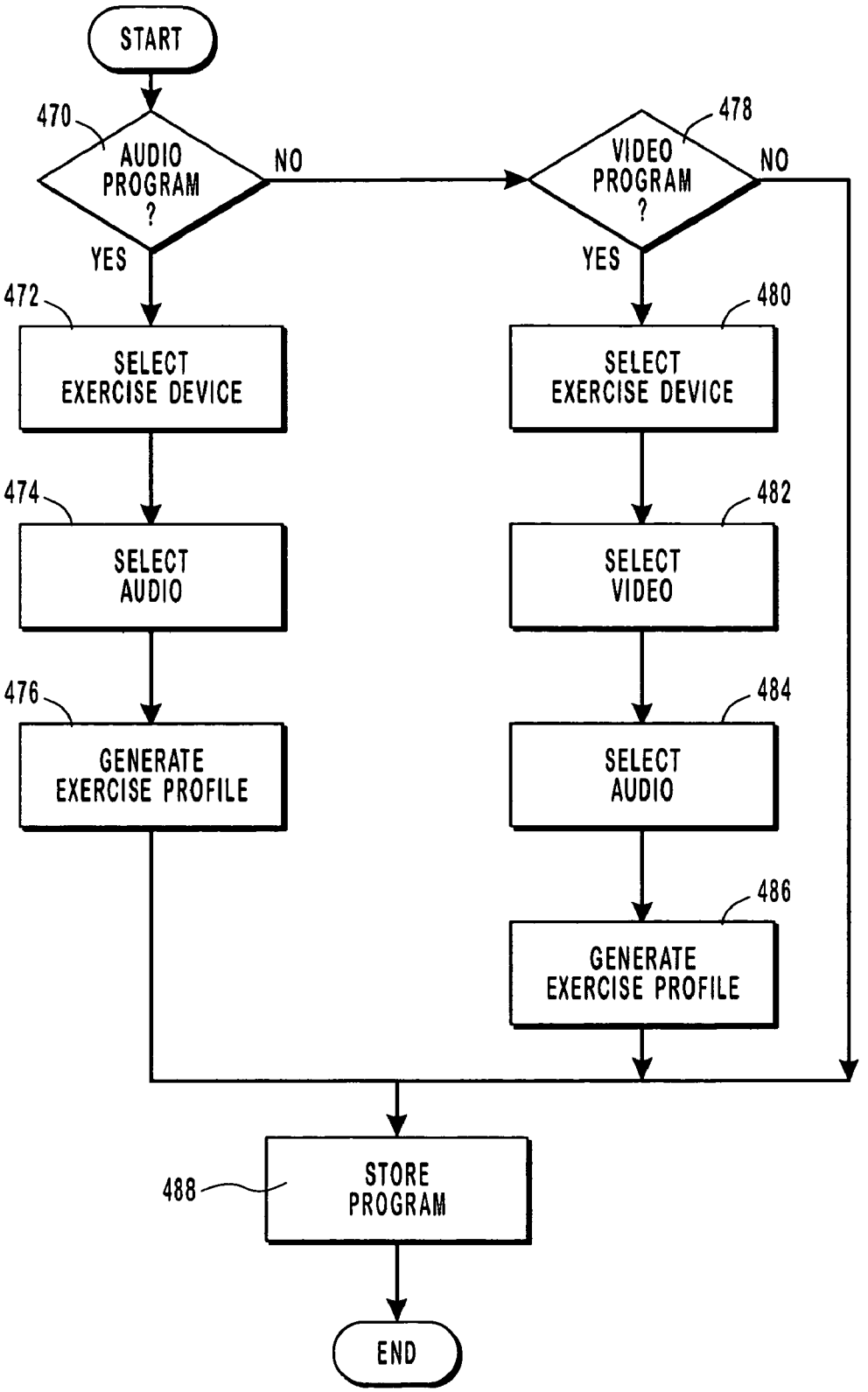
START
470
AUDIO PROGRAM ?
NO
YES
478
VIDEO PROGRAM ?
NO
YES
472
SELECT EXERCISE DEVICE
474
SELECT AUDIO
476
GENERATE EXERCISE PROFILE
480
SELECT EXERCISE DEVICE
482
SELECT VIDEO
484
SELECT AUDIO
486
GENERATE EXERCISE PROFILE
488
STORE PROGRAM
END

FIG. 19

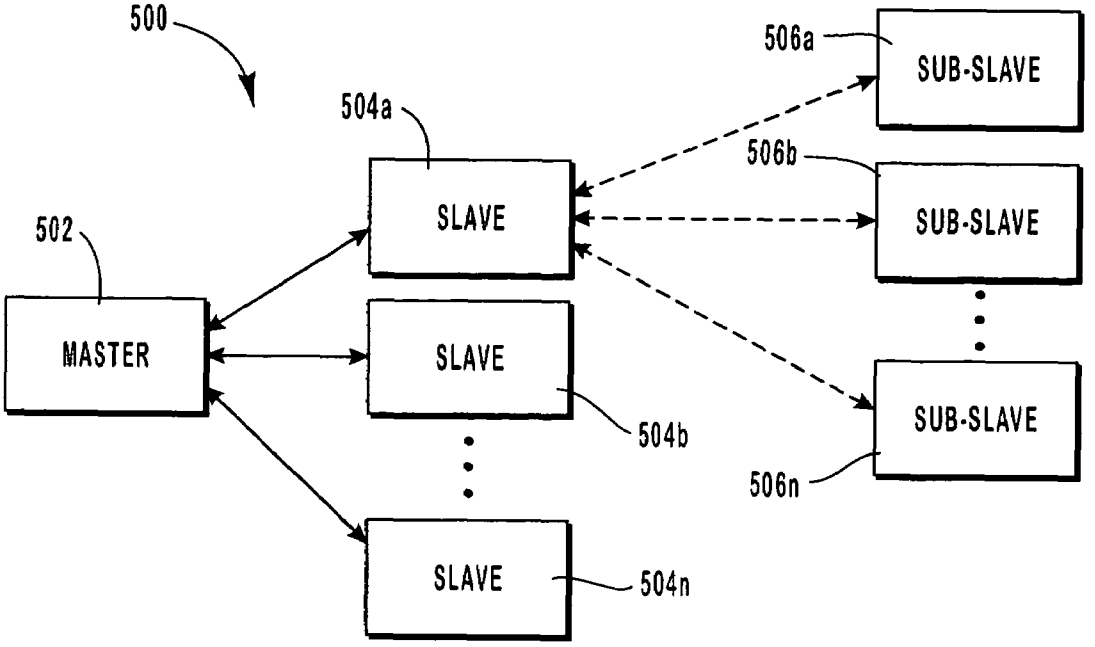
500
502
MASTER
504a
SLAVE
SLAVE
504b
SLAVE
504n
506a
SUB-SLAVE
506b
SUB-SLAVE
SUB-SLAVE
506n

FIG. 20

SYSTEMS FOR INTERACTION WITH EXERCISE DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a divisional application of U.S. patent application Ser. No. 09/641,627, filed Aug. 18, 2000, now U.S. Pat. No. 7,166,062 entitled "Systems for Interaction with Exercise Device," which is a continuation-in-part application of both U.S. patent application Ser. No. 09/349,608, filed Jul. 8, 1999, now U.S. Pat. No.6,312,363 entitled "Systems and Methods for Providing an Improved Exercise Device with Motivational Programming," and U.S. patent application Ser. No. 09/496,560, filed Feb. 2, 2000, now U.S. Pat. No. 6,447,424 entitled "System and Method for Selective Adjustment of Exercise Apparatus," each of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. The Field of the Invention

This invention relates to exercise equipment and, more specifically, to systems and methods for providing improved exercise devices in combination with other users and/or a live or stored trainer via a communications network.

2. The Relevant Technology

In an attempt to improve their health and physical conditioning, consumers are purchasing home exercise devices in record quantities. One common challenge with home exercise equipment is motivating the purchaser to use the device on a consistent and ongoing basis, while providing access to experienced trainers and individually developed exercise programs from the comfort of a user's own home. In addition, many exercise devices involve repetitive actions, which can quickly become tedious to a person exercising alone.

Health clubs, on the other hand, have organized various exercise classes and routines involving a group setting. In the proper setting, a group approach to exercise creates a synergy, whereby individual members of the class derive encouragement and motivation from other members of the group.

Furthermore, while individuals exercise at a health club they are taught the correct techniques for exercising, thereby reducing the possibility of being injured during an exercise program. In addition, group settings promote a healthy sense of competition among group members. Initially, such group fitness and exercise classes typically involved aerobics, traditionally performed without the use of any ancillary exercise equipment or devices. In recent years, however, the group work out approach has been extended to classes that utilize various exercise devices. Take, for example, the recent rise in popularity of "Spinning Classes," in which each participant operates his or her own stationery exercise cycle in a group setting, with a coach or instructor leading the group through a prescribed program or routine. Similarly, with recent advances in the design of treadmills, it is possible to have "Treadmill Classes" wherein an instructor not only leads the group, but the instructor is also able to control the operation of the treadmills of all of the class participants from a single control panel.

One of the primary disadvantages with group training, however, is that it is typically available only at health clubs and, therefore, is not as convenient as exercising in the privacy and comfort of one's own home. It would, therefore, be a definite advancement in the art of home exercise equipment to provide the desirable benefits of group exercise in a home setting. Some efforts have been made in the prior art to introduce a level of "interactivity" into exercise machines. For example, U.S. Pat. No. 5,489,249 discloses a video exercise control system in which a videocassette recorder (VCR) or similar device is coupled, via a hard wired connection, to an exercise machine, such as a treadmill. As an individual exercises on the treadmill, the VCR in synchronization with prerecorded audio/video presentations controls the speed and incline of the treadmill. U.S. Pat. No. 5,645,509, entitled "Remote Exercise Control System" that is incorporated herein by reference, discloses a remote exercise control system in which an exercise machine, such as a treadmill, may remotely communicate via a communications module with an evaluation module located at a remote location. Signals indicative of the operating parameters of the treadmill are transmitted from the treadmill to the evaluation module, and control signals are transmitted from the remote evaluation module for controlling the operating parameters of the treadmill. U.S. Pat. No. 5,888,172 is representative of another, in which an exercise device is coupled, via hard wired connection, to a video game device, such that the operating parameters of the exercise device are used as inputs to the video game controller, which then produces a video display based on the inputs received. However, these approaches nevertheless fail to provide many desirable benefits of group exercise.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention is to improve home exercise equipment by providing home exercise devices that are capable of simulating a group or class workout environment and synchronizing operation of the exercise devices with exercise programming.

It is an object of the present invention to provide an exercise device that is capable of being controlled by packetized signals received from a trainer.

It is another object of the present invention to provide an exercise device that is capable of enabling a user to communicate with a distantly located trainer.

It is yet another object of the present invention to provide an exercise device that communicates with a communication system that enables real-time communication with a trainer or alternatively access to one or more stored exercise programs.

Yet another object of the present invention is to provide an exercise system that enables one or more users to receive real-time signals from one or more trainers via a network.

Still yet another object of the present invention is to provide an exercise system that enables a third party to control one or more user exercise devices and one or more trainer exercise devices in real-time.

Another object of the present invention is to provide an exercise system that enables a user to access various exercise equipment and information from a variety of locations.

Still a further object of the present invention is to provide a system where one device is capable of controlling one or more operating parameters of one or more other devices.

Yet another object of the present invention is to provide a system where the various modules of the system may be incorporated within a variety of devices.

Another object of the invention is to provide exercise devices that incorporate modules for receiving and decoding control signals embedded in multimedia (i.e., audio and/or video) programming for controlling various operating parameters of the exercise device in synchronization with the multimedia programming.

It is another object of the invention to provide exercise devices that are responsive to control signals that are encoded

in programming external to the exercise device and containing audio and/or video and that can be transmitted and received by the exercise device.

Yet another object of the invention is to provide enhanced exercise devices, the operation of which can be controlled using interchangeable, multimedia programming containing control signals that is received via the Internet.

Yet another object of the invention is to provide an improved exercise machine that facilitates live, interactive communications between a treadmill user at home and a trainer or coach in a remote location, and which enables the trainer or coach to control the operating parameters of the user's treadmill on a live, real time basis.

The present invention is directed to devices, systems, methods, programs, a computer products, computer readable media, and modules for controlling the operating parameters of one or more devices by one or more distantly located, or optionally closely located, devices through the use of packetized data technology. The present invention is particularly well suited to devices that utilize one or more motors and/or other electrically driven actuators that control one or more operating parameters of a device, such as an exercise device.

In one embodiment, the exercise device is configured to enable a user to interact with a trainer in real-time communication and includes an exercise mechanism having a movable element for movement in performance of exercise by a user. One example of such an exercise device is a treadmill, although a variety of different exercise devices may be employed. By employing real-time communication and interaction with a trainer, an exerciser can interact with the trainer, thereby achieving many of the benefits of a group exercise session in a home environment.

The exercise device of the present invention may have a variety of different forms. However, in one exemplary embodiment, an exercise device configured to enable a user to interact with a trainer in real-time communication, comprises: (i) an exercise mechanism comprising a movable element; (ii) one or more user interface devices, that communicates with the exercise mechanism and gathers a first real-time signal from the user; (iii) a communicating mechanism that communicates with the interface device and enables real-time transmission of the first signal to the trainer and receives a packetized second real-time signal. The second real-time signal may comprise a variety of signals, such as control signal and/or audio and visual signals. A processor, responsive to a control signal is configured to control the operating parameters of the exercise mechanism in real-time.

Thus, according the present invention, it is possible for a user to exercise on a device, such as a treadmill, while a trainer receives data regarding the operating parameters of the treadmill (and optionally of the user of the treadmill, e.g., heart rate), such as speed, inclination, etc. Upon receiving this data, the trainer can modify the operating parameters of the user's treadmill such that the user achieves an exercise program designed by the trainer. The trainer can also communicate in real-time with the user without interrupting any control signals that control the treadmill or other exercise device. The user can also communicate with the trainer without affecting any of these controls during such communication.

A variety of different options are available for achieving the desired real-time communication. According to one such option, a user can receive a broadcast from a live trainer (human being) or a stored trainer (e.g., a website, video, disk, or dynamic or interactive software program) upon activating the exercise device. As another option, the user can receive programming in response to a signal sent by the user. As yet another option, the trainer can analyze information about the exercise device (e.g., speed) and/or user (e.g., heart rate) and control the operating parameters of the exercise device and/or provide recommendations to the user through audio or video communication.

Thus, the present invention relates to an exercise device capable of achieving real-time communication with either: (i) a live or (ii) stored trainer. The present invention also relates to an exercise system comprising: (i) one or more user devices, such as an exercise device; (ii) one or more trainer devices, such as another similar exercise device connected to each other in a master/slave relationship. Optionally, in addition to the master and slave devices, a third party can control the master and/or slave. Examples of such third parties include an individual located at a master control console that controls the master and/or slave, such as in the setting of a spinning class.

The trainer and user may be linked in direct communication (e.g., master/slave) or indirect communication, such as by linking both the trainer and the user to a communication system that controls the operating parameters of an exercise device used by the user and/or trainer. For example, if both the trainer and the user devices are connected to a communication system, such as a website, the website may control the user device and/or the trainer device. Alternatively, the communication system may track changes of the operating parameters of the trainer device and modify the operating parameters of the user device based upon the changing parameters of the trainer device.

Optionally, a stored trainer (e.g., a website) controls a user device without requiring the services of a live trainer. The present invention also enables first and second users to compete against each other by connecting their corresponding exercise devices to a communication system, such as a website.

The present invention also relates to programming, computer products and computer readable medium including instructions designed to facilitate the above-described systems, inventions and exercises and other systems, devices, and exercises. As will be discussed in greater detail, the present invention is not limited to any particular device, although treadmills and other exercises are employed as examples to illustrate the operation and function of the present invention.

These advantages in addition to other objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by the practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instruments and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the manner in which the above recited and other advantages and features of the invention are obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof that are illustrated in the appended drawings. Understanding that these drawing depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

FIG. **1** is an exercise system according to the teaching of the present invention;

FIG. **2** is a perspective illustration of a reorienting treadmill with the tread base positioned in a first position for a user to perform exercises to be used in the exercise system of FIG. **1**;

FIG. **3** is a perspective illustration of a reorienting treadmill of FIG. **2** with the tread base positioned in a second or storage position;

FIG. **4** is a partial plan view of portions of the reorienting treadmill illustrated in FIGS. **2** and **3** with the treadmill oriented in the second or storage position and with the bottom cover removed, revealing some of the internal components of the treadmill;

FIG. **5** is a partial exploded perspective view of the incline mechanism incorporated into the treadmill illustrated in FIGS. **2** through **4**;

FIG. **6** is a perspective illustration of a control panel of the reorienting treadmill of FIG. **2**;

FIG. **7** illustrates an exemplary computer and associated system that provides a suitable operating environment for the exercise system of FIG. **1**;

FIG. **8** is a functional block diagram of a communication system of the exercise system of FIG. **1**;

FIG. **9** is a functional block diagram of the treadmill and computer with associated translator box of FIG. **1**;

FIG. **10** is a functional block diagram of the exercise system of FIG. **1**;

FIG. **11** is a more detailed functional block diagram of the exercise system of FIG. **10**;

FIG. **12** is a functional block diagram of the illustrative modules of the communication module;

FIG. **13** is a flow diagram illustrative of the process of gathering information through the login/registration module of FIG. **12**;

FIG. **14** is a functional block diagram of illustrative modules of the audio program module of FIG. **12**;

FIG. **15** a flow diagram illustrative of the process of selecting an audio program for a particular exercise device selected from those illustrated in FIG. **14**;

FIG. **16** a functional block diagram of the illustrative modules and functions of the personal training module of FIG. **12**;

FIGS. **17**A-D are flow diagrams representative of the processes a user performs using the competition module of FIG. **12**;

FIG. **18** is a flow diagram representing the process of performing diagnostic on the treadmill of FIG. **2** from a distant location;

FIG. **19** is a flow diagram representing the actions performed by the user and communication module to create audio and video programs in accordance with the teaching of the present invention;

FIG. **20** is a functional block diagram of a master-slave system according to the teaching of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to devices that include one or more motors or other electrically driven actuators used to control one or more operating parameters of the device. While the invention will be described in the context of a motorized treadmill, it should be understood that the invention is not limited to any particular type of exercise device. To the contrary, the present invention can be readily adapted to any motorized device or any other device that utilizes motors, solenoids, or any other electrically driven actuators to control any operating parameter of the device, such as speed, resistance, incline, time, temperature, or other similar operating parameters. The term "device" or "devices" shall refer broadly to any type of apparatus that includes one or more stepper motors, solenoids, or other electrically driven actuators or controllers. Additionally, the term "exercise devices" shall refer broadly to any type of device that takes the form of an exercise machine, including, but not limited to, treadmills, exercise cycles, Nordic style ski exercise devices, rowers, steppers, hikers, climbers, and elliptical or striding exercise devices.

Depicted in FIG. **1** is a representation of one illustrative system, designated by reference numeral **10**, that may incorporate the novel features of the present invention, including various novel devices, hardware and software modules, and the like that may be remotely accessed and controlled in a real-time manner. As shown, one or more exercise mechanisms, such as a treadmill **12***a*-**12***n* is in communication with one H or more trainers at treadmill **20***a*-**20***n* via a translator device **13** and a personal computer **14**. The translator device **13** and personal computer **14** communicate with a network **16** that is a communication network that enables various hardware and software modules and devices to communicate one with another. Network **16**, therefore, may be a local area network (LAN), wide area network (WAN), wireless network, packetized network, real-time network, and the like. Network **16** facilitates communication of treadmill **12** with a live trainer on treadmill **20** and/or communication system **18** (e.g. a website). Communication system **18** assists communication between a user on treadmill **12** and either a live trainer on treadmill **20**, or some other third party **21**, as will be described in more detail hereinafter. Optionally, communication system **18** acts as a stored trainer or connects to a stored trainer.

The following discussion will be directed to only a single treadmill **12** and a single treadmill **20**, however, it may be appreciated that a similar discussion may be had for multiple treadmills **12***a*-**12***n*, **20***a*-**20***n*. In addition, although only one of each element of system **10** is depicted, it may be appreciated by one skilled in the art that system **10** may have a mixture of both single and multiple elements, for example, at least one treadmill **12**, **20**, translator device **13**, personal computer **14**, network **16**, and communication system **18**. Alternatively, one or more of the elements of system **10** may be eliminated or the functionality thereof incorporated within the structure and function of one or more of the other elements of system **10**.

Similarly, although each of the elements of system **10** are shown separated one from another, it may be appreciated by one skilled in the art that the hardware G and/or software elements of the present invention may be incorporated within two or more elements. For example, translator device **13** and personal computer **14** may be incorporated within treadmill **12**. Similarly, the hardware and/or software elements of the communication system **18** may be incorporated within treadmill **20**.

As defined herein, the term "trainer" or "third party" **21** may include: (i) a live human being; or (ii) a stored trainer, such as a website, computer, optical media (e.g., compact disk or digital video disk), visual media, or magnetic media (e.g., videotape, readable disk), an electronic monitoring system, dynamic computer readable instructions, interactive and/or dynamic software programs, computer readable instructions, and other media and hardware and/or software modules and components, whether or not the trainer is located at treadmill **20** or at some other location. In one embodiment, the third party is another trainer.

Generally, system **10** enables exercise programming with control signals to be transmitted from a trainer at treadmill **20**, or alternatively from communication system **18**, to a user at treadmill **12**. As disclosed in U.S. Pat. No. 09/349,608

entitled "Systems and Methods for Providing an Improved Exercise Device with Motivational Programming," which is incorporated herein by reference, the programming may include motivational content and/or one or more control signals that may be used to control the operating parameters of treadmill **12** in real-time in an uninterrupted manner. The control signals may be synchronized with the motivational content and designed to control one or more operating parameters of the exercise device, such as the speed, incline, difficulty of exercise program, time, distance, and the like of an exercise program performed on treadmill **12**.

As used herein, the term "motivational content" is used to broadly refer to any audio material, including dialog, narration, sound effects, and/or music, either alone or in combination with video material. In one embodiment of the present invention, the motivational content is stored in communication system **18** and includes an audio/video presentation of a personal trainer and others engaged in a series of exercises of varying difficulty. In another embodiment of the present invention, the motivational content is a live-on-live, real-time exercise program presented by one or more personal trainers that is either specific to one particular user or alternatively broadcast or optionally "webcast" to any user that may access communication system **18**. In still yet another embodiment, the programming includes an exercise profile of the intensity of various exercise criteria, such as, but not limited to, speed, incline, or resistance of the exercise device, that is displayed continually or periodically to the user during the performance of the programming. In still yet another embodiment of the present invention, the user controls the period of when the exercise profile appears. One skilled in the art may appreciate that various other configurations of programming are applicable.

Generally, the second real-time signal may include both the motivational content and the control signals, whether or not such control signals are synchronized with the motivational content. Alternatively, the second real-time signal may include only the motivational content, other signals representative of measurable parameters of the exercise device (e.g. speed, inclination, resistance, etc) and/or a user of the exercise device (e.g. heart rate, blood pressure, etc), and the like. For example, treadmill **12** may transmit one or more signals to communication system **18**. The signal may include parameters such as the status of the exercise device, e.g., active status (i.e., on), deactivated status (i.e., off), standby status (i.e., waiting), and the like, and/or parameters such as speed, inclination, resistance. Additionally, the signal may include parameters regarding the user, such as heart rate, blood pressure, and the like. Alternatively, treadmill **12** may receive programming "broadcast" by communication system **18** and/or a trainer at treadmill **20**, such that any treadmill with the capabilities to receive the programming may access such, without the need to transmit one or more signals.

As mentioned above, the control signals control the operating parameters of treadmill **12**, such as speed, inclination, resistance, and the like. Such control may be achieved by a trainer at treadmill **20**, a combination of a trainer at treadmill **20** and communication system **18**, or a third party **21** interacting with treadmill **20** and/or communication system **18**. Generally, the present invention allows control of a device, such as an exercise device, without the need to interrupt the other portions of the programming, such as the real-time audio and/or video.

FIGS. **2** through **5** generally depict a typical motorized, reorienting treadmill **12**. Although the discussion herein will be directed to treadmill **12**, it may be appreciated by one skilled in the art that treadmill **20** may include all or a portion of the elements, modules, and means discussed herein

Treadmill **12**, in one embodiment, includes a control panel **22** supported on a generally upright support structure **24** and a tread base **26**. Upright support structure **24**, in this illustrative embodiment, includes two side members **28**, **30** coupled together by way of one or more cross members **32**. Side members **28**, **30** and cross members **32** may have various configurations and may be fabricated from various materials so long as they are capable of supporting control panel **22** and tread base **26**. For example, the elements of upright support structure **24** may be fabricated from, but not limited to metals, plastics, composites, combinations thereof, and the like. Additionally, one skilled in the art may appreciate that various other exercise devices may have different upright support structures, side members, and cross members, or be devoid of one or more of such structures and members.

The tread base **26** typically includes a pair of side rails **34**, **36** each having a front portion proximal to and a rear portion distal from upright support structure **24** when tread base **26** is in a downward exercisable position. As shown in FIG. **4**, a front pulley **38** and a rear pulley **40** are disposed between and supported by side rails **34**, **36**, while a continuous belt **42** extends between and around front and rear pulleys **38** and **40**, respectively. Pulleys **38**, **40** and belt **42** may have various configurations and be fabricated from various materials, as known by one skilled in the art and commonly known within the exercise industry.

A deck **44**, commonly fabricated from wood, typically supports the upper run of belt **42** and supports an exercising individual resting upon belt **42**. Although deck **44** is preferably of a cellulose material such as wood, various other types of material may be used so long as deck **44** is capable of supporting belt **42** and a user exercising thereupon.

As best seen in FIG. **4**, in one embodiment, front pulley **38** is mechanically coupled to an electric tread drive motor **46** by way of pulleys **48** and **50** and a drive belt **52**. In this illustrative embodiment, motor **46** further incorporates an inertial flywheel **54** that controls fluctuations in the rotational motion of a shaft of motor **46** during operation of treadmill **12**. Motor **46** is optionally electrically coupled to a treadmill controller **56** that controls the operation of motor **46**, and thus the speed of belt **42**, in response to various user inputs or other control signals. As shown, treadmill controller **56** is incorporated within tread base **26**; however, it may be appreciated by one skilled in the art that treadmill controller **56** may be incorporated within control panel **22** or alternatively within personal computer **14**.

In addition to the ability to control and vary the speed of belt **42**, treadmill **12** also permits the degree of incline of tread base **26** relative to the floor, or other surface upon which tread base **26** rests, to be varied. Typically, this is accomplished through the use of an incline drive motor **60** that rises or lowers one end of tread base **26** relative to the other end. In the embodiment illustrated in FIGS. **2** through **5**, tread base **26** includes a pair of rear feet **62** and **64** that are rotatably attached to the rear of portion of side rails **34**, **36**. As best seen in FIGS. **4** and **5**, feet **62** and **64** are mechanically coupled through a shaft **66** to incline drive motor **60**, which causes feet **62** and **64** to pivot about their points of pivotal attachment to side rails **34**, **36**, thereby selectively raising or lowering the rear end of tread base **26** relative to the front end thereof. Motor **60** is also optionally electrically coupled to, and controlled by the treadmill controller **56**.

As shown in FIG. **2**, treadmill **12** (and optionally treadmill **20**) includes control panel **22** attached to side members **28**, **30** of upright support structure **24**. Control panel **22**, in one

embodiment, as shown in FIG. **6**, includes one or more interface devices. Such interface devices may be either input devices or output devices. Input devices enable a user to input and vary the operating parameters of treadmill **12**. As examples of such input devices, control panel **22** includes many typical controllers for use on an exercise device, such as a treadmill. A number of illustrative input devices include but are not limited to speed controls **68**, incline controls **70**, time controls **72**, distance controls **74**, a start button **76**, a stop or pause button **78**, and heart rate controls **80**. In addition to these input devices, such as one or more controllers, control panel **22** further optionally includes an iFit.com button **82**, a manual override button **84**, and a scaling control **86**, each of which are also examples of input devices. It may be appreciated that each of the above-recited controllers or buttons may be embodied in a variety of different manners to perform their commonly utilized function. In addition, each controller, button, and the like may take the form of one or more switches, rheostats, potentiometers, touch sensitive controls, voice activated controllers, and the like. The input devices described herein are examples of structures capable of performing the function of interface means for gathering a first signal (such as a real time signal) from the user. One skilled in the art may identify various other configurations of interface means that are capable of performing the desired function. Additionally, it may be appreciated that treadmill **20** may also include such interface means.

As shown in FIG. **6**, iFit.com button **82**, in one embodiment, acts as both a selector and an indicator of connectivity of treadmill **12** to communication system **18**, and optionally treadmill **20**, whether such connectivity is via translator device **13**, computer **14**, or directly from treadmill **12**. The iFit.com button **82** optionally includes an indicator light (not shown) that demonstrates when a connection has been established between treadmill **12** and communication system **18**, such as when iFit.com button **82** is depressed. Alternatively, a light emitting diode (LED) positioned in close proximity to iFit.com button **82** may be activated when iFit.com button **82** is activated.

The connection achieved by activating iFit.com button **82** may be via a variety of communication line connections. For example, as shown, control panel **22** includes a wireless port **105** that enables treadmill **12** to wirelessly communicate with network **16** (FIG. **1**), either directly or via computer **14** and/or translator device **13**. Alternatively, wireless port **105** may be located on tread base **26**. Various other types of port or interface may be included within treadmill **12** to enable communication via one or more communication line connections. For example, treadmill **12** may include one or more ports and interfaces to enable communication line connection through existing broadcast technology, including television broadcast over the airwaves, cable or cable modems, satellite, telephone lines, whether analog or digitally based, the internet, DSL, G-Lite, wireless technology, infra-red (IR) technology, other high-speed data connections, or any other suitable transmission technology or medium. Optionally, a communication port on a user treadmill may enable communication directly with another treadmill (such as in a master/slave scenario), whether or not such communication utilizes a network.

In one embodiment, by activating iFit.com button **82**, a user of treadmill **12**, or other exercise device, connects to communication system **18**, such as a website. Such connection may be via an independently located computer, such as computer **14**, through translator device **13** or directly through a local area network (LAN) or wide area network (WAN) by way of the described communication line connections for example, or other connections known to one skilled in the art.

More specifically, by activating the iFit.com button **82** a signal is transmitted to communication system **18** to create a connection therebetween. In this manner, treadmill **12** may receive signals representative of exercise programming from communication system **18**. Additionally, the connection with communication system **18** enables the user to obtain the services of a stored trainer or a personal trainer to perform programming, ask questions, download or access programming materials, surf the web, gather and send electronic mail messages ("e-mail"), listen to audio programming, view video programming, review and update user information and statistics, load user statistics, purchase exercise programming, equipment, and materials, update exercise device software and operating parameters, research exercise materials, and the like.

Furthermore, activation of the connection with communication system **18** enables treadmill **12**, or other exercise device, to have the potential of being controlled during an exercise program by a third party, whether that third party is another personal trainer using another treadmill **20**, a stored communication system **18**, or some other individual, hardware, or software modules or components. For example, a third party individual or a stored third party trainer may operate a console controlling the operation of one or more exercise devices in a group class setting, including devices operated by a live or stored trainer and by trainee users. This may be useful in a spinning class or other class in which a trainer trains trainee users. In one embodiment, as the third party controls the operation of the exercise devices, the trainer can communicate motivational messages to the trainee users.

Similarly, activation of the connection with network **16** and/or communication system **18** enables one or more users to interact one with another, and optionally compete one against another as shall be described in detail hereinafter. For example, a first user on treadmill **12***a* may receive information regarding the workout performed by a second user on treadmill **12***n* via network **16** and/or communication system **18**, then compete against the second user and vice versa. This competition may be live on live or time adjusted, e.g., a workout recorded previously by the second user which the first user competes against. Greater information about communication system **18**, with its associated modules and components will be discussed in detail hereinafter.

As mentioned above, control panel **22** may include manual override button **84**. Manual override button **84** enables a user to override an action initiated by (i) a live trainer or (ii) a stored trainer, such as communication system **18**, stored programming that is located within the memory of computer **14**, or alternatively in memory stored in treadmill **12**. For example, if the exercise program accessed through communication system **18** is too difficult for the user, the user may activate manual override button **84** thereby interrupting the program delivered to treadmill **12** by communication system **18**. Furthermore, in the event that the exercise program is too easy, the user may increase the difficulty level of the exercise device. Consequently, manual override button **84** provides the user with a safety switch during operation of treadmill **12**. In an alternate configuration of treadmill **12**, the functionality of manual override button **84** is activated upon manual activation of one of the other input devices, such as but not limited to, incline controls **74**, speed controls **76**, stop/pause button **78**, and the like.

Similar to the operation of manual override button **84**, scaling control **86** enables a user to vary the operating parameters of treadmill **12** during an exercise program initiated externally to treadmill **12**. A user may activate scaling control **86** and vary the intensity of an exercise program. The scaling

control **86**, therefore, enables a user to select a value representative of the proportional change to be made to the control signal received by the communicating mechanism of treadmill **12** from communication system **18**. For example, if an exercise program requires a maximum speed of 6 miles per hour (mph) with a maximum incline of 15 degrees for a period of 30 minutes, an individual may activate scaling control **86** to require only 66% intensity of the exercise program; stated otherwise, reduce the intensity by one third. Therefore, the exercise program is varied to a maximum speed of 4 mph, with a maximum incline of 10 degrees, for a period of 20 minutes. Optionally, scaling control **86** may enable the user to set maximum values for each operating parameter of treadmill **12**. In another configuration, scaling control **86** may enable the user to scale only one operating parameter of treadmill **12** while leaving other parameters unchanged. Hence, the user may vary the exercise program to their particular abilities, while obtaining the beneficial effects of exercising.

As another example of an input device of the present invention, control panel **22** may include a diagnostic control **88**. Upon activation of diagnostic control **88**, whether be depressing a button or by some other manner known to one skilled in the art, treadmill **12** communicates with communication system **18** to check the operating status of the exercise device. Communication system **18**, thereby sends signals to the internal hardware and software modules of treadmill **12** to verify that the modules are operating within the desired specifications or to determine whether treadmill **12** may include software for which an update is available. In one embodiment, in the event that one or more of the hardware and/or software modules are damaged or not performing as required, communication system **18** may download one or more software updates from communication system **18** if possible. Alternatively, communication system **18** may inform the user that an error has occurred and advise that the user obtain maintenance of the hardware components of treadmill **12**.

As additional examples of input devices, according to another aspect of the present invention, control panel **22** may include an audio input device **90** and a video input device **92**. Audio and video input devices **90**, **92** enable a user to perform communication, such as real-time communication, with other users of exercise devices, via communication system **18** (FIG. **1**). The audio and video input devices **90**, **92** also enable the user to hear and/or watch (i) a live trainer or (ii) a stored trainer, such as recorded programs, educational programming, entertainment programming, and the like. The diagnostic control **88**, audio input device **90** and video input device **92**, therefore, are structures capable of performing the function of interface means, communicating with the exercise mechanism, for gathering a first signal from the user. Various other configurations of such interface means are known to one skilled in the art in view of the teachings contained herein.

In one embodiment, audio input device **90** may take the form of a microphone, while video input device **92** may take the form of a video camera. Audio input device **90** and video input device **92** may alternatively take various other configurations as known by one skilled in the art. For example, audio input device **90** may be a microphone detachably connected to control panel **22** or another part of treadmill **12**. In another configuration, audio input device **90** may be located distant from treadmill **12**, while being capable of gathering the audio inputs from the user. In still another configuration, audio input device **90** may be eliminated from treadmill **12**, while treadmill **12** includes an audio jack, such as an RCA-type audio jack, RJ-type jacks, digital audio jack, and the like. In still another configuration, audio input device **90** may be a radio frequency (RF), infra red (IR), or wireless type microphone. Similarly, video input device **92** may have the configuration of a digital video camera integrally formed within control panel **22**. Alternatively, video input device **92** may be detachably connected to control panel **22** or another part of treadmill **12**, such as wireless digital cameras. Still in another configuration, video input device **92** may be located distant from treadmill **12**, while being capable of gathering the requisite video signals to be transmitted to communication system **18** (FIG. **1**).

In addition to the above-described audio and video input devices **90**, **92** respectively, control panel **22** may include a variety of other input devices. For example, control panel **22** may include an integrally formed mouse **100**. Additionally, control panel **22** may include a keyboard jack **102** for an external keyboard **103**, a controller port **104** for receiving one of a variety of game controller, an integrally formed mouse **100**, a touch-sensitive video display, and various other ports, jacks, or the like to receive various other external components. Each input device is adapted to allow a user operating treadmill **12** to more fully operate one or more operating parameters of treadmill **12**. Furthermore, the input devices enable the user to access communication system **18** and/or obtain educational, entertainment, or other information via network **16**, whether such information is from communication system **18** or from one of a variety of other hardware and/or software modules that are accessible via network **16**. For example, the input devices may allow the user to surf the Internet to find educational materials or entertainment. These additional input devices are further examples of structures capable of performing the function of interface means, communicating with the exercise mechanism, for gathering a first signal from the user.

Control panel **22**, in one embodiment includes one or more output devices that provide a visual and optionally an audio indication of the operational status of treadmill **12** to the user. As with the input devices, the output devices may have various configurations and perform numerous functions. Generally, the output devices described herein are each structures capable of performing the function of means for reproducing a signal. The output devices and hence the means for reproducing a signal may have various configurations as known to one skilled in the art in view of the teaching contained herein. In one embodiment, one video output device **94** may be a video display. Generally, video output device **94** presents the user of treadmill **12** with information and data transmitted from communication system **18**, whether such data is live transmission from treadmill **20**, or alternatively stored programming accessible by communication system **18**. Additionally, video output device **94** may optionally show information and data from: (1) various other sources selected by the user, third parties, or system **10**; (2) statistical information representative of the operational parameters of treadmill **12**, such as the speed, incline, duration of user's workout, etc.; (3) electronic mail messages (e-mail), and the like. Video output device **94**, in one embodiment is a liquid crystal display (LCD) or cathode ray tube (CRT) display.

One skilled in the art may appreciate that various other devices may be used to perform the functions of video output device **94**. For example, video output device **94** maybe an electroluminescent display (ELD), a gas-plasma display, a thin film transistor (TFT) display, a virtual reality (VR) display, and the like. In another embodiment of the present invention, control panel **22** includes multiple video output devices **94**. In still another embodiment, video output device **94** is adapted to permit split screen or layered images that are associated with picture-in-picture viewing of various images

and information. For example, video output device **94** may allow a user to watch various types of entertainment and/or surf the Internet, while receiving images representative of the exercise profile that they are following whether continuously, periodically, upon activation of a user control, or the like.

As shown in FIG. **6**, in one embodiment of the present invention, control panel **22** includes an audio output device **96**, such as a speaker. Audio output device **96** performs a similar function to that of video output device **94**, in that audio output device **96** provides the user with audible signals representative of the operational parameters of treadmill **12**. Additionally, audio output device **96** may deliver audio, visual, or control signals to the user from communication system **18** and treadmill **20**. Such signals may be audible and/or inaudible signals transmitted from the trainer on treadmill **20**. Various speakers are applicable and may operate as audio output device **96**, for example, hardwired and wireless speakers, such as computer speakers, audio system speakers, and the like. Control panel **22** may optionally include one or more amplifiers in cooperation with audio output device **96**. Furthermore, audio output device **96** may be circumvented through use of one of a variety of audio jacks that enable a user to listen to the audio output through headphones or similar audio transmitting device.

In addition to the output devices described above, the present invention may include various other output devices to provide information and data to the user of treadmill **12**. In one embodiment of treadmill **12**, control panel **22** includes one or more operating parameter displays. The one or more operating parameter displays give a visual display of some of the more important exercise device operating parameters, such as, but not limited to, speed, incline, distance traveled, calories used, elevation climbed, wheel resistance, and the like. The one or more operating parameter displays may use a numerical display, a graphical display, combinations thereof, or such other displays known to one skilled in that art. For example, the operating parameter display may be incorporated within video output device **94**.

As shown in FIG. **1**, communicating with treadmill **12** via personal computer **14** is communication system **18** and treadmill **20**. Those skilled in the art will appreciate that computer **14** may take various configurations, including personal computers, hand-held devices, multi-processor systems, microprocessor-based or programmable consumer electronics, telephones, network PCs, minicomputers, mainframe computers, and the like. Additionally, computer **14** may be part of a distributed computer environment where tasks are performed by local and remote processing devices that are linked (either by hardwired links, wireless links, or by a combination of hardwired or wireless links) through a communications network, such as network **16**. Furthermore, as suggested earlier, treadmill **12** may optionally incorporate the functionality of personal computer **14** therein or include one or more modules or components of computer **14** while not incorporating all the modules and components of computer **14**.

The following discussion will focus on certain examples of alternate structures that may be used as computer **14**; however it is understood that a similar discussion may be made for the hardware and/or software modules and components associated with communication system **18**, treadmill **20**, and/or a third party **21**. Furthermore, it may be appreciated that treadmill **12**, treadmill **20**, communication system **18** and third party **21** may incorporate portions of computer **14** as described herein and appreciated by one skilled in the art in light of the teaching contained herein. Similarly, one skilled in the art will recognize that treadmill **12** and/or communication system **18** may includes some or all of the modules and components of computer **14**.

Generally, computer **14** is configured to receive data from various portions of treadmill **12** and deliver manipulated data to the hardware and/or software modules or components associated with communication system **18** and/or treadmill **20** or other treadmills **12***a-n*. In addition, computer **14** communicates with communication system **18** and retrieves audio, video, and control signals therefrom and provides these signals to treadmill **12**, whether or not the signals are initiated solely by communication system **18**, treadmill **20**, a third party **21**, or another treadmill **12***a*-**12***n*. Computer **14** may, therefore, use various types of interfaces to communicate with treadmill **12** and network **16**. For example, the interface may be a wireless interface thereby utilizing IR, RF, satellite, blue tooth transmission and associated protocols. Alternatively, the interface may be a modem, cable modem, ADSL connection, ISDN, Ethernet, or similar other connections, voice activated, and the like.

Following herein after is a general discussion of possible modules and components of computer **14**. The following discussion is merely illustrative of modules and components that may form computer **14**. It is appreciated that some of the referenced modules may be eliminated while other modules and components may be included within computer **14**, as known by those skilled in the art.

With reference now to FIG. **7**, in one embodiment of the present invention computer **14** is a general-purpose-computing device, including a processing unit **110**, a computer memory **112**, and a computer bus **124** that couples various computer components including the computer memory **112** to the processing unit **110**. The computer bus **124** may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. Additionally, when treadmill **12** includes computer **14** and/or translator **13** computer bus **124** may be an I^2C bus, a SPI bus, a microwire bus, a microbus, and the like. Also, computer bus **124** may use the CAN protocol, CSAFE 1 protocol, or some other protocol known to one skilled in the art to allow communication between treadmill **12** and communication system **18** and/or treadmill **20** either directly or through network **16**.

The computer memory, in this particular embodiment, includes read only memory (ROM) **126** and random access memory (RAM) **128**. A basic input/output system (BIOS) **130**, containing the basic routines that help transfer information between elements within computer **14**, such as during start-up, may be stored in ROM **126**.

The computer **14** may also include a magnetic hard disk drive **132** for reading from and writing to a magnetic hard disk **138**, a magnetic disk drive **134** for reading from or writing to a removable magnetic disk **140**, and an optical disk drive **136** for reading from or writing to removable optical disk **142** such as a CD-ROM or other optical media. The magnetic hard disk drive **132**, magnetic disk drive **134**, and optical disk drive **136** are connected to computer bus **124** by a hard disk drive interface **144**, a magnetic disk drive-interface **146**, and an optical drive interface **148**, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer-executable instructions, data structures, program modules, and other data for computer **14** as will be discussed in detail hereinafter. Although the exemplary environment described herein may employ a magnetic hard disk **138**, a removable magnetic disk **140**, and a removable optical disk **142**, other types of computer readable media for storing

data can be used, including magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, RAMs, ROMs, and the like.

Computer **14**, in one embodiment, further includes program code means comprising one or more program modules that may be stored on hard disk **138**, magnetic disk **140**, optical disk **142**, ROM **126** or RAM **128**, including an operating system **150**, one or more application programs **152**, other program modules **154**, and program data **156**. A user may enter commands and information into computer **14**, in one embodiment, through a keyboard **160**, pointing device **162**, or other input devices (not shown), such as, but not limited to microphones, joy sticks, game pads, satellite dishes, scanners, video cameras, potentiometers, buttons, switches, rheostats, or the like, whether such devices are incorporated within treadmill **12** or in communication with translator device **13** and/or computer **14**. These and other input devices are often connected to processing unit **110** through a serial port interface **164** coupled to computer bus **124**. Alternatively, the input devices may be connected by other interfaces, such as a parallel port, a game port, or a universal serial bus (USB), and the like. A monitor **166** or another video display device, such as those described herein is optionally connected to computer bus **124** via an interface, such as video adapter **168**. In addition to the monitor, personal computer **14** may include other peripheral output devices (not shown), such as one or more speakers, and printers for obtaining recent statistical information regarding the user's workouts.

The computer **14**, as depicted in this illustrative embodiment, may operate in a networked environment using logical connections to one or more remote computers, such as remote computer **170**. The computer **14** may also communicate with treadmill **12** via a LAN and optionally communicate with communication system **18** and treadmill **20** via a WAN and optionally remote computer **170**. Generally, each remote computer **170**, communication system **18**, and treadmill **12**, **20** may be or include the structure and perform the function of another personal computer, a server, a router, a network PC, a peer device, or other common network node, and typically includes many or all of the elements described above relative to computer **14**, although only one memory storage device **172** and its associated application program **174** has been illustrated in FIG. **7**. The logical connections depicted in FIG. **7** include local area network (LAN) **176** and a wide area network (WAN) **178** that are presented here by way of example and not limitation. Such networking environments are commonplace in office-wide or enterprise-wide computer networks, intranets and the Internet.

When used in a LAN networking environment, typically computer **14** is connected to the local network **176** through a network interface or adapter **180** that communicates via one of a variety of communication line connections, such as those described previously. When used in a WAN networking environment such that computer **14** may communicate with communication system **18**, computer **14** may include a modem **182**, a wireless link, or other means for establishing communications over the wide area network **178**, such as the Internet. The modem **182**, which may be internal or external, is connected to computer bus **124** via serial port interface **164**. In a networked environment, program modules depicted relative to computer **14**, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means for establishing communications over wide area network **178** may be used.

Various transmission or communication protocols may be used to enable computer **14** to receive and transmit data through network **16**. In one embodiment of the present invention, computer **14**, and more specifically, network interface **180** or serial port interface **164**, may use TCP/IP communication protocol. Alternatively, computer **14** may use connection orientated or connectionless networks via asynchronous transfer mode (ATM) technology, X.25 protocol, Frame Relay protocol, packet switching protocols, circuit switching protocols, dynamic packet switching protocols, 802.11RF protocol, home network protocols, CSAFE 1, CAN protocols, and the like to transmit and receive data through network **16**.

The term "transceiving" as used herein will mean transmitting, receiving, or a combination of both transmitting and receiving data. The term "packetized", "packetizing", and the like, as used herein will mean data that has been manipulated into one or more packets according to a packet switching protocol for transmission via network **16**, such as may be understood in light of the following teaching and knowledge within the art.

Generally, the packet contains the destination address in addition to the data. Each packet may be transmitted individually or may be combined or pooled with other packets of data going to similar destinations, such as audio data, video data and/or control signals. The packets of data or pooled data are optionally compressed and encapsulated for transceiving across network **16**, where each packet may follow different routes to its destination. Once all the packets of a specific data message arrive at the destination, they are decompiled and deencapsulated into the original data. The packets may be prioritized according to content so that certain packets of data are delivered to computer **14**, and hence treadmill **12**, through network **16** faster than the other packets of data. For example, in a live-on-live exercise program situation audio and video data or signals are transceived faster than the control signals. Therefore, according to one embodiment, an individual may communicate with a trainer in real time without the need to interrupt the real-time communication between the trainer and the user so that one or more control signals may be delivered to the exercise device. An advantage of packetizing data, therefore, is that computer **14**, translator device **13**, and/or treadmill **12** may optimize its performance according to the available bandwidth of the communication connection line with network **16** without the need to interrupt the real-time communication between a user and a trainer.

The discussion above describes a computer detached from treadmill **12**; however, as appreciated and stated earlier, all or portions of computer **14** may be optionally incorporated within treadmill **12**. As such, some or all of the various elements of computer **14** may be incorporated within control panel **22**, or alternatively within tread base **26**. In various other configurations of the present invention, therefore, control panel **22** may include one or more magnetic hard disk drives, magnetic disk drives, optical disk drives, and associated interfaces. Control **22**, therefore, may be capable of accessing programming that is stored on computer diskettes, CD ROMs, DVDs, and the like. Additionally, control panel **22** may optionally include a keypad integrally formed therein, or optionally include a standard keyboard interface that may enable a user to communicate with treadmill **12**. The keypads and keyboard enable the user to control the operation of treadmill **12**, and optionally communicate with communication system **18** and other hardware and/or software modules that may be accessible via network **16**.

As depicted in FIG. **1**, computer **14** may optionally communicate with translator device **13** that is configured to

manipulate signals transmitted and received between computer **14** and treadmill **12**. Specifically, translator device **13** may be used when computer **14** and treadmill **12** are incapable of directly communicating one with another. Translator device **13** includes one or more processors that convert the signals passed therethrough to a form that the device to receive such signals might understand. For example, computer **14** may communicate with translator device **13** via a serial connection, while treadmill **12** may only communicate with devices that deliver data via a serial I^2C connection or protocol. As such, translator device **13** is configured to manipulate the serial signal received from computer **14** into a signal capable of being delivered via a serial I^2C connection or bus.

It may be appreciated by one skilled in the art that translator device **13** may convert various types of signal to various other forms capable of being transmitted to various interfaces. For example, translator device **13** may use a SPI bus, a microwire bus, a microbus, a CAN protocol, a CSAFE 1 protocol, a home network protocol, TCP/IP communication protocol, an asynchronous transfer mode (ATM) technology, X.25 protocol, Frame Relay protocol, packet switching protocols, circuit switching. protocols, dynamic packet switching protocols, 802.11RF protocol, serial, parallel, USB, or wireless connection, and the like. Additionally, the structure and function of translator device **13** may be completely or partially incorporated within treadmill **12**, computer **14**, or a combination thereof.

Generally, computer **14** and/or translator device **13**, collectively and/or individually are examples of a communicating mechanism, communicating with the interface means (e.g., the input devices of console **22** that gather a signal from the user). In one embodiment, the communicating mechanism enables real-time transmission of a first signal to: a live trainer (e.g., on treadmill **20**), a stored trainer (e.g., communication system **18**), another user, or a third party **21**, for example. The communicating mechanism may also receive a packetized second real-time signal from any of these sources.

The second real-time signal may be an audio or visual signal directed to the user and/or a control signal directed to a device, such as an exercise device **12**, for example. The audio and/or visual signal and the control signal may come from the same source, such as a trainer **20**. In one embodiment, however, the second real-time signal comprises an audio and/or visual signal from one source and a control signal from another source. For example, the audio and/or visual signal may come from a live trainer, while the control signal may come from a website or vice versa. Optionally, the audio, visual, and control signals are each directed both to the user and to the exercise device, such as when the control signal is an audible signal directed to a microphone connected to the device.

Computers **14** and/or translator device **13** portions are collectively or individually examples of a communicating mechanism. Additionally, when portions of one more computers **14** and/or translator devices **13** are incorporated within treadmill **12**, such portions are collectively or individually examples of a communicating mechanism. Examples of such a communicating mechanism of the present invention may comprise (i) a single structure that enables transmission of the first signal and/or receives the packetized second signal or (ii) a first structure that enables transmission of the first signal and a separate second structure that receives the packetized second signal. Any of these communicating mechanisms are examples of structures capable of performing the function of communicating means, communicating with the interface means, for receiving a packetized second signal (such as a real-time signal), and optionally, for enabling transmission of the first signal (such as a real-time signal).

In one embodiment, the communicating means only receives the second signal. For example, upon merely activating a user input device, such as by turning the power of the exercise device or other device on, a first signal is "gathered from the user," but is not transmitted. Instead, the first signal merely activates the power and enables the communicating mechanism to receive any second packetized signal that may be broadcast to the exercise device. Such a broadcast may be from a communication system **18**, such as by wireless transmission, RF transmission, or other means known to those skilled in the art. In another embodiment, the communicating mechanism transmits the first signal and receives the second signal.

Additionally, computer **14** and/or translator device **13**, collectively and/or individually are examples of structures capable of performing the function of control means, communicating with the exercise mechanism, for receiving one or more packetized control signals from the communication system indicative of the selected exercise program and for changing one or more operating parameters of the exercise mechanism based upon the selected exercise program and the one or more packetized control signals.

As discussed above with respect to FIG. **1**, computer **14** may transceive one or more signals to and from communication system **18** through network **16**. Referring now to FIG. **8**, a schematic block diagram of communication system **18** is illustrated. For simplicity, only the most relevant hardware components are illustrated in FIG. **8**. It may be appreciated by one skilled in the art that various other components may be included within communication system **18** depending on the particular use and function of communication system **18**.

As depicted, communication system **18** includes an interface **190** that communicates with a control processor **192** and an interface **198**. Interface **190** is configured to transceive one or more signals to and from computer **14** and treadmill **12** via network **16**. Such signals may include audio and visual signals of the user exercising, the status of the exercise device, such as active status, deactivated status, standby status, data and information about the user, such as heart rate, blood pressure, and the like that has been gathered by one or more health monitoring devices. Such devices may include but are not limited to electodes, transducers, other ECG monitoring devices, a pulse watch, a heart rate monitor, an EKG electronic detection device, an ECG electronic detection device, and the like. Similarly, interface **198** enables communication system **18** to transmit the above signals to and receive various signals from a trainer at treadmill **20** via network **16** (FIG. **1**). Such received signals may include audio, visual, and/or control signals. Alternatively, the trainer at treadmill **20** may receive no signals, in the case where communication system **18** controls treadmill **12** without a trainer at treadmill **20**.

Each interface **190**, **198** therefore, may be of a variety of types depending on the particular communication line connection used in system **10** and the particular transmission protocols used by computer **14**, treadmill **12**, translator device **13**, or treadmill **20**. For example, interfaces **190**, **198** may be a wireless interface, may use infrared (IR), radio frequency (RF), microwave technology, satellite, blue tooth transmission, home network protocols, or various other protocols and technology as known by one skilled in the art. Alternatively, interfaces **190**, **198** may be a modem, cable modem, ADSL connection, ISDN, Ethernet, or similar other connections. Interfaces **190**, **198** either solely or in combination with the other elements of communication system **18**, may use various transmission protocols to transceive data between treadmill

12 and treadmill 20 via communication system 18. It may be appreciated by one skilled in the art that interfaces 190, 198 need not be the same, so long as they may communicate with control processor 192, and the other appropriate elements of system 10.

Communicating with interface 190 and interface 198 is a control processor 192. Control processor 192 is configured to transceive signals through interface 190 and manipulates the same based on selected programming selected by: (i) the user; (ii) a trainer located at treadmill 20; (iii) a third party 21; or (iv) a combination thereof. Subsequently, control processor 192, optionally in combination within interface 190 or 198, prepares the selected programming (i.e., audio and video signals with associated control signals, if any) for transmission to treadmill 12 and 20. Control processor 192 also preferably "packetizes" the programming so that packets of information may be "streamed" or downloaded through respective interfaces 190, 198 to computer 14, and subsequently treadmill 12, or to treadmill 20. Each packet of data may be sent individually, and may follow a different path across network 16 to reach computer 14 (or treadmill 12). Upon reaching computer 14 (or treadmill 12 or 20), the data may be "buffered" so that the data may be delivered to the user or trainer in real-time.

Generally, control processor 192 may include one or more micro-controllers, central processing units, state machines, programmable logic arrays, network logical arrays, or gates, ASIC processors, software-based controllers, combination logic, combinations thereof, and a variety of other controllers known by one skilled in the art to manipulate data transceived between treadmill 12, communication system 18, and/or treadmill 20.

Control processor is one example of a structure capable of performing the function of means for synchronizing and packetizing the control signals with the programming and delivering the packetized control signal to the user device. It may be appreciated that various other control processors and means are appropriate and known to those skilled in the art.

Communicating with control process 192 is memory 194 and external memory 196. As shown, external memory 196 is optionally included, depending on the particular data storage needs of communication system 18. For example, memory 194 and/or external memory 196 may include physical information regarding the operation of treadmill 12. Additionally, memory 194 and/or external memory 196 may be one structure capable of performing the function of storage means for storing programming. Memory 194 and/or external memory 196 may, therefore, include or be configured to access one or more audiocassette tapes, compact disks (CDs), mini disks (MDs), computer diskettes, videotapes, laser disks (LDs), digital videodisks (DVDs), computer diskettes, or such other media capable of storing audio and/or video programming, with associated control signals. Additionally, memory 194 and/or external memory 196 may store a particular set of control signals in synchronization with the above-recited audio and video media programming. In light of the teaching contained herein, it may be appreciated by one skilled in the art, that either memory 194 and/or external memory 196 may take the form of or include a database structure that enables access to the various programming stored therein.

Also communicating with control processor 192 is control signal generator 200. Control signal generator 200 includes circuitry and/or software to generate the control signals that are synchronized with the audio and video programming retrieved from memory 194 and/or external memory 196 or alternatively transmitted from treadmill 20 through interface 198. Therefore, control signal generator 200 may include one or more micro-controllers, central processing units, state machines, programmable logic arrays, network logical arrays, or gates, ASIC processors, software-based controllers, combination logic, combinations thereof, and a variety of other controllers known by one skilled in the art to generate one or more control signals.

Control signal generator 200 is one structure capable of performing the function of means for generating one or more control signals. One skilled in the art may identify various other configurations of means for generating one or more control signals.

Various configurations are applicable for encoding a control signal on a carrier signal included with the audio and video programming. Following hereinafter is a discussion of one format for encoding the control signals. It should be understood that the method of encoding set forth herein is representative only and is not intended to limit the scope of this invention or to limit the various other alternative means or methods by which a control signal may be transmitted to treadmill 12 and/or optionally treadmill 20. Additionally, any number of encoding schemes, which are known to those skilled in the art, may be used to carry out the desired function and are encompassed within, the scope of the present invention.

In one embodiment, the control signals generated by control signal generator 200 are carried on a two (2) kHz carrier signal, with each control signal consisting of two transmission bursts, each burst having three bytes of data. The second burst is intended to exactly duplicate the first burst for error checking purposes. The first byte of data of each burst, generated by control signal generator 200, in this illustrative embodiment, indicates the desired speed of the treadmill, while the second byte of data indicates the desired incline of the tread base 26, and the third byte is a check sum of the first and second bytes. For other exercise devices the first and second bytes may represent other operating parameters, like resistance of an elliptical device or cycle device. It may be appreciated that each burst may include less or more than 3 bytes of data, depending on the different type of device that communicates with communication system 18. As configured, the control signal uses a standard RS-232 protocol. Alternatively, control signals may also use other serial or parallel protocols, such as RS-422, RS-423, universal serial bus (USB) and various other communication protocols known by one skilled in the art in light of the teaching contained herein.

In one embodiment, each control signal includes both the first burst and the second burst. Generally, the control signal is typically left in one quarter second in duration. Each byte consists of eight bits of data, giving a high degree of resolution for controlling the exercise device operating parameters, such as treadmill speed and the degree of incline. In one embodiment, each time a control signal is inserted into the programming, the control signal entirely suppresses the audio portion of the programming for the duration of the control signal. Alternatively, and more preferably, the control signal does not entirely suppress the audio portion of the programming. Rather the control signal overlays the programming so that the programming is uninterrupted. As a result, the control signals are audible to the user which also provides an audible cue or warning to the user that one or more operating parameters of treadmill 12 is about to change. Alternatively, the control signals are inaudible to the user, but may be analyzed by computer 14 and/or treadmill 12. The inaudible signals may, therefore, dictate an additional or alternate manner by which the user is signaled of an impending change in one or more operating parameters of treadmill 12. For example, in

addition to an audio signal, the control signal may include a video signal, such as a flashing red border that may appear around the exterior perimeter of the video output device **94** and overlap the video display to inform the user of a change in operating parameters of treadmill **12**. It may be appreciated by one skilled in the art that a combination of both audio and video indicators, whether or not the programming is modified, such as the audio being eliminated, or the video being eliminated, may be used to inform the user of an impending change in operating parameters.

As alluded to above, the control signals are detectable by computer **14** or treadmill **12**, that verifies the control signal has the proper 2 kHz carrier frequency, checks to make sure that the control signals otherwise properly formatted, and check for errors. If the signal is approved, the signal is delivered to the appropriate controllers for varying the operating parameters of treadmill **12**.

Generally, the operation of communication system **18** varies depending on the particular manner by which the programming is to be delivered to user on treadmill **12**. In one configuration, treadmill **20** is similarly configured to treadmill **12**, previously described. In such a case, when an individual wishes to perform an exercise program in real-time with a distantly located trainer training on treadmill **20**, the trainer, preceding the scheduled exercise time, accesses or "logs on" to communication system **18**. Upon logging onto communication system **18**, the trainer prepares the desired exercise program or alternatively selects a stored control signal profile that is synchronized to the desired program from memory **194** and/or external memory **196**. At the scheduled time for a live-on-live treadmill exercise program, both the user of treadmill **12** and the trainer located at treadmill **20** access communication system **18**. The trainer activates the control signal profile, which is delivered to control processor **192**. Control processor **192** delivers to both treadmill **12** and treadmill **20** both the audio and/or video programming and the desired control signals to vary the operating parameters of each treadmill **12**, **20** in synchronization with the audio and/or video programming. Control processor **192**, optionally in combination with interfaces **190**, **198** prepares, the control signals with the audio and video signals in accordance with the communication protocol that computer **14**, translator device **13**, treadmill **12** and/or treadmill **20** uses. Alternatively, control processor **192** may deliver control signals to treadmill **12** to vary the operating parameters thereof, while sending an audio and/or video representation of the exercise profile (i.e., speed, distance, time, inclination of the exercise device) of the exercise program delivered to the user, so that the trainer may then manually vary the operating parameters of treadmill **20** as desired. The delivery of the programming including the control signal may be termed a packetized second signal (preferably a packetized second real-time signal).

In one embodiment, changes made by the trainer on treadmill **20** are translated into control signals that are delivered to treadmill **12** to vary the operating parameters therein. As such, treadmill **20** includes one or more sensors that identify changes made to the operating parameters of treadmill **20** and deliver signals representative of such changes to control processor **192**. Upon receiving the sensed information, control processor **192** delivers a request to control signal generator **200**. Control signals generator **200** subsequently generates a control signal associated with the actions taken by the trainer on treadmill **20** and passes those signals through control processor **192**, interface **190**, and optionally computer **14** to treadmill **12**. The delivery of the programming including the control signal may be termed a packetized second signal or a packetized second real-time signal.

In still yet another configuration, treadmill **20** is configured to include control signal generator **200**. In this particular configuration, as a trainer performs a programming workout, whether such programming is stored on treadmill **20** or alternatively accessed through communication system **18**, control signal generator **200** creates the bursts of bytes in accordance with changes made by trainer made on treadmill **20**. As such, the control signals are sent from treadmill **20** through interface **198** to control processor **192**. Control processor **192** then passes the control signals along with the audio and video programming, through interface **190** to treadmill **12**. The delivery of the programming including the control signal may be termed a packetized second signal (preferably real-time).

It may be appreciated by one skilled in the art, that the various above-described configurations are only illustrative of the manner by which treadmill **20** may control the operation of treadmill **12** either directly or alternatively indirectly through the use of control signal generator **200** and the other components and modules of communication system **18**.

Following hereinafter, and depicted in FIG. **9**, is a function of block diagram of one embodiment of treadmill **12**. In this particular configuration, the functionality of personal computer **14** is not incorporated within treadmill **12**; however, as may be appreciated by one skilled in the art, computer **14** may be incorporated within control panel **22** or other portions of treadmill **12**. This embodiment enables true interactive communication between a user operating treadmill **12** in his/her own home, and a personal trainer located at a remote location, such as where treadmill **20** is located. Additionally, the trainer may observe the user in real-time and control the user's treadmill **12** remotely and in real-time via communication system **18** without interrupting the real-time audio and video programming.

As shown, treadmill **12** includes control panel **22** and treadmill controller **56**. Although shown separated, it may be appreciated that portions of each may be combined together, thereby simplifying the modules and components of the present invention. Control panel **22**, in this embodiment, incorporates audio input device **90** in the form of a microphone and a video input device **92** in the form of a video camera for gathering audio and video signals to be transmitted to communication system **18**. As mentioned previously, the audio and video receivers need not be incorporated within control panel **22** or other portion of treadmill **12**. Rather, audio input device **90** and video input device **92** may be located distant from treadmill **12**, while having sufficient detection controls to receive the requisite audio and video signals.

Signals from audio input device **90** and video input device **92** are delivered to an audio/video controller **212**. Audio/video controller **212** is configured to manipulate the audio and video signals received from input devices **90**, **92** in preparation for transmission to a processor **214**. Audio/video controller **212**, therefore, includes one or more amplifiers, microcontrollers, central processing units, state machines, programmable logic arrays, network local logical arrays, or gates, ASIC processors, software based controllers, combination logic, or combinations thereof to both manipulate audio and video signals that are to be transmitted or received by input devices **90**, **92** and associated output devices **94**, **96**. Additionally, audio/video controller **212** may include memory, such as a buffer, to store and aid with real-time transmission and delivery of the audio and video signals. It may be appreciated by one skilled in the art that various audio/video controllers **212** are applicable and known in the art in light of the teaching contained herein.

Communicating with audio/video controller **212** is processor **214**. Processor **214** converts the audio and video data received through audio/video controller **212** into the desired form that is capable of being transmitted to communication system **18** via communication interface **210**. As such, processor **214** may perform various operations on the data to be delivered to communication system **18**, such as, but not limited to, packing, encrypting, splitting, and the like. Additionally, processor **214** may be configured to perform various operations to data received from communication system **18**, such as, but not limited to, the reverse of the above operations. Generally, processor **214** may have various configurations to perform the above-described function as known by one skilled in the art. For example, processor **214** may take the form of one or more micro-controllers, central processing unit (CPU), state machines, programmable logic arrays, or network of logical gates, ASIC processor, software-based controllers, a combination of these components, or a variety of other controllers.

According to another aspect of the present invention, processor **214** may receive various inputs from one or more manually operated input devices **216**, such as manual override button **84**, scaling controls **84**, and other controls and buttons known to one skilled in the art in light of the teaching contained herein. In response to such inputs, processor **214** may vary the operating parameters of treadmill **12** and provide the user with notification of such change in the operating parameters of treadmill **12** via output devices **218** and/or video output device **94** and audio output device **96**. Processor **214**, therefore, is one structure capable of performing the function of means for controlling the operating parameters of the exercise mechanism in real-time and one structure capable of performing the function of control means for receiving one or more packetized control signals from a communication system indicative of a selected exercise program and changing one or more operating parameters of the exercise mechanism based upon the selected exercise program and the one or more packetized control signals.

Communicating with processor **214**, in one embodiment, is communication interface **210** that enables treadmill **12** to transceive data, such as packetized data, via a communication line. Communication interface **210**, in one embodiment, is a modem. Depending on the particular communication manner used to communicate with communication system **18**, different communication interfaces **210** may be used at different communication line connections. For example, the communication line connection may include existing broadcast technology, including television broadcast over the airwaves, cable or cable modems, satellite, telephone lines, whether analog or digitally based, the internet, DSL, G-Lite, wireless technology, other high-speed data connections, or any other suitable transmission technology or medium. As such, communication interface **210** is compatible with existing conventional broadcast technologies and can interface with existing audio and/or video components commonly found in homes, thereby reducing the overall cost of the exercise device and reducing barriers to accessing communication system **18**.

Communicating with processor **214** and optionally communicating with communication interface **210** is treadmill controller **56**. As illustrated in FIG. **9**, treadmill controller **56** communicates with control panel **22**. Generally, treadmill controller **56** may communicate with control panel **22** by an I^2C bus, a SPI bus, a microwire bus, a microbus, and the like.

In one embodiment, treadmill controller **56** includes a treadmill processor **220**, memory **222**, and a control signal decoder **224**. Treadmill processor **220** is configured to control the operation of speed motor **226** and incline motor **228** that controls the speed and incline of treadmill **12**. Treadmill processor **220**, therefore, is one structure capable of performing the function of means for controlling the operating parameters of the exercise mechanism in real-time and one structure capable of performing the function of control means for receiving one or more packetized control signals from a communication system indicative of a selected exercise program and changing one or more operating parameters of the exercise mechanism based upon the selected exercise program and the one or more packetized control signals.

Treadmill processor **220** is optionally controlled by processor **214** or by control signal decoder **224** in response to the various signals received through communication interface **210** from communication system **18**. Alternatively, treadmill processor **220** may be controlled by signals obtained from memory **222**, via input devices **216**, audio input device **90** and video input device **92**. Treadmill processor **220** may include various components and modules to perform the desired function. For example, treadmill processor **220** may include one or more micro-controllers, central processing unit (CPU), state machines, programmable logic arrays, or network of logical gates, ASIC processor, software-based controllers, combination logic, a combination of these components, or a variety of other controllers.

Controller **212**, processor **214**, interface **210**, and treadmill processor **220** are collectively and individually examples of structures capable of performing the function of communicating means, communicating with the interface means, for receiving a packetized second signal, and optionally, for enabling transmission of the first signal.

Both processor **214** and treadmill processor **220** are capable of receiving and transmitting feedback signals from the various elements of treadmill **12**, for example, feed back from drive motor **226** and incline motor **228**. Each processor **214**, **220** is capable of converting the feedback signals into signals for the video output device **94** or monitor **166** communicating with computer **14**. The particular feedback signals received from speed motor **226** and incline motor **228** may be stored in registers or memory modules.

Treadmill **12**, as depicted, optionally includes one or more sensors, such as belt speed sensor **230** and incline sensor **232**. Each sensor **230**, **232** gathers a particular operating parameter of treadmill **12** (speed of belt **42** (FIG. **4**) and incline of tread base **26**), such that control panel **22** may present outputs via the output devices that are indicative of the present operating state of treadmill **12** at any given point in time. Treadmill **12** may include other sensors that gather various other operating parameters, such as, but not limited to, maximum pulse and heart rate, average pulse and heart rate, target heart rate, length of workout session, and the like. Additionally, sensors **230**, **232**, optionally in combination with one or more other sensors, may determine whether an individual is actually exercising on treadmill **12** and deliver a feedback signal to processor **214** that informs communication system **18** and/or the trainer. Furthermore, sensors **230**, **232**, optionally in combination with one or more other sensors, may calculate whether the individual is a juvenile and stop treadmill **12** in the event that the user is a juvenile.

As discussed earlier, system **10** enables a user of treadmill **20** to communicate with and control one or more operating characteristics or parameters of treadmill **12**. There are various manners by which treadmill **12** may be controlled by communication system **18** solely or in combination with treadmill **20** or a third party **21**. Following hereinafter is a continued discussion of the operation of the illustrated embodiment of treadmill **12** depicted in FIG. **9**.

During operation of treadmill **12** a user initially inserts a dead-man key (not shown) within port **98** of control panel **22** (FIG. **6**). Upon insertion of the dead-man key, treadmill **12** is capable of being operated, i.e., power is allowed to flow to the various internal and external components of treadmill **12** and treadmill **12** has an active status. Once activated, a user may optionally connect to communication system **18** or use a stored or manually defined exercise program or workout. In the event that the user wishes to connect to communication system **18**, in one embodiment, a user activates iFit.com button **82** (FIG. **6**), thereby initiating the hardware and/or software modules within either treadmill **12** or computer **14** to create a connection with communication system **18**. Alternatively, upon placing treadmill **12** in active status, treadmill **12** may automatically connect to communication system **18**.

Once a link is achieved and a user optionally has provided a password and user identification, a user may select either stored or live-on-live exercise programs. Following the user selection, programming, whether live or stored is delivered (optionally in real-time) to communication interface **210** via one or more of a variety of communication line connections, whether such connections are digital, analog, serial, parallel, or a combination thereof. The particular configuration of communication interface **210** may vary based upon the particular communication line connection used.

It may be appreciated by one skilled in the art that the exercise program may be displayed to the user in a variety of manners, depending on the particular signals received from communication system **18** or trainer device **20**. For example, the programming may include an exercise profile that periodically or continually appears on video output device **94**. Alternatively, the programming may solely include the above-described exercise profile, thereby enabling the user of treadmill **12** to view educational or entertainment programming via video output device **94** during their exercise program.

Upon receiving the programming, communication interface **210** may optionally deliver the audio signal to control signal decoder **224** that identifies the control signal. In another setting, communication interface **210** may deliver both the audio and video signals, with the control signal, to processor **214** for manipulation and distribution to the appropriate hardware components, and/or software modules. Such delivery of programming may be performed through use of a general-purpose bus or a variety of other buses and protocols, such as an I^2C bus, SPI bus, Microwire bus, Microbus, CAN protocol, home network protocol, or the like. Additionally, the control signals, and the audio and the video signals may be delivered using the CSAFE 1 protocol or equivalent thereof for various other types of devices not within the field of exercise devices.

When communication interface **210** delivers all signals to processor **210**, processor **214** separates the audio, video, and control signals and optionally delivers them to audio/video controller **212**, control signal decoder **224**, treadmill processor **220**, or memory **224**. For example, in one configuration processor **214** may optionally deliver portions of the audio and video signals to control signal decoder **224**, either directly or through treadmill processor **220** such that the audio and video signals are "buffered" in accordance with "streaming" technology. If the available bandwidth does not allow real-time streaming of audio and video signals, video frames and the audio signals may be separated and transceived so that a segmented display is provided with real-time audio signals. Although segmenting of video frames is not preferred it is one possible alternative method of streaming audio and video signals. In another configuration, upon receiving the signals from processor **214**, control signal decoder **224** may optionally store the complete audio and video signals for an entire program before treadmill **12** may access such signals. In yet another configuration, processor **214** may optionally deliver only the audio signal and the control signal to treadmill processor **220** that may include the functionality of control signal decoder **224** therein. The particular manner by which treadmill processor **220** retrieves either the encoded control signal or the decoded control signal may vary from configuration to configuration depending on the particular form of treadmill **12**.

Generally, control signal decoder **224** either individually or collectively with processor **214** and/or treadmill processor **220** is one structure capable of performing the function of means for decoding the control signal having an input and an output. One skilled in the art may identify various other configurations of a means for decoding the control signal having and input and an output. For example, treadmill processor **220** and/or processor **214** may include a control signal decoder and hence be a means for decoding the control signal having an input and an output.

Following manipulation of the control signals to obtain the control instructions, treadmill processor **220** performs the control process on the various components of treadmill **12** as dictated by the control instructions. For example, treadmill processor **220** may cause motor **46** to speed up thereby accelerating belt **42** or alternatively cause motor **60** to rotate thereby raising or lowering tread base **26**. Motors **46**, **60** and **226**, **228** are structures capable of performing the function of means, electrically coupled to the output of the decoding means for driving the moveable element in response to the decoded control signal. It may be appreciated by one skilled in the art that the control instructions may cause various other changes to the operating parameters of treadmill **12**, and other devices. Similarly, various means for driving the moveable element in response to the decoded control signal. For example, the means may vary depending on the particular type of exercise device used.

While treadmill processor **220** is either decoding the control signal from the audio signal received from communication system **18** or merely activating speed motor **226** and/or incline motor **228**, processor **214** delivers the audio and video signals received through communication interface **210** to audio/video controller **212**. Audio/video controller **212** manipulates the signals received and passes the audio signal to audio output device **96** and the video signal to video output device **94**. Optionally, processor **214** may send portions of the audio or video signals to the output devices **218** to provide the user with multiple sources of representations of the current operating parameters of treadmill **12**, or exercise device.

In another alternative configuration of the present invention, the audio, video, and control signals received by communication interface **210** are delivered to processor **214** for manipulation and delivery to audio/video controller **212**. In such a case, the video data is displayed on video output device **94** while the audio signal including the control signal is transmitted to audio output device **96**. In this configuration, audio input device **90** or a second audio input device (not shown) is configured to receive various control signals that are delivered by audio output device **96** and pass those back to processor **214**. The control signals are subsequently decoded and treadmill processor **220** may activate speed motor **226** and/or incline motor **228** in accordance with the delivered control signals.

Generally, communication interface **210**, processor **214**, audio/video controller **212**, treadmill processor **220**, and/or control signal decoder **224** are collectively and individually

examples of a controller, responsive to the packetized second signal, configured to control the operating parameters of the exercise mechanism (preferably in real-time). Additionally, such controller is a structure capable of performing the function of control means, communicating with the exercise mechanism, for receiving one or more packetized control signals from the communication system indicative of the selected exercise program and for changing one or more operating parameters of the exercise mechanism based upon the selected exercise program and the one or more packetized control signals. It may be appreciated by one skilled in the art that the control means may have various other configurations.

Following hereinafter is a generalized discussion of a number of features of an exercise system, exercise devices, methods, computer products, and computer readable media associated with the teaching and disclosure of the present invention. Referring now to FIGS. **10-19**, a system **250** is illustrated. The majority of the features described with respect to system **10**, also apply to system **250**.

Generally, this embodiment of the present invention may comprise one or more hardware components, such as those described above and illustrated in FIGS. **1**, **7**, and **10**, and various special-purpose or general-purpose computers. Embodiments within the scope of the present invention also include computer-readable media for carrying or having computer-executable instructions or data structures stored thereon. Such computer-readable media can be any available media that can be accessed by a general-purpose or special-purpose computer and the hardware and/or software modules associated with system **10** (FIG. **1**). By way of example, and not limitation, such computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM, or other optical disk storage, magnetic disk storage, or other magnetic storage devices, or any other medium which may be used to carry or store desired program code means in the form of computer-executable instructions or data structures and which may be accessed by a general-purpose or special-purpose computer. When information, such as one or more signals or programming is transferred or provided over network **16** or another communications connection (either hardwired, wireless, or a combination of hardwired or wireless) to treadmill **12**, translator device **13**, computer **14**, communication system **18**, and/or treadmill **20**, such devices properly view the connection as a computer-readable medium. Thus, any such a connection is properly termed a computer-readable medium. Combinations of the above should also be included within the scope of computer-readable media. Computer-executable instructions may include, for example, instructions and data which cause a general-purpose computer, special-purpose computer, or special-purpose processing device to perform a certain function or group of functions.

Although not required, the present invention will be described in the general context of computer-executable instructions, such as program modules, that may be executed by one or more computers in various network environments, such as within the environments illustrated in FIGS. **1**, **7**, and **10**. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Computer-executable instructions, associated data structures, and program modules represent examples of program code means for executing steps of the methods disclosed herein. The particular sequence of such executable instructions or associated data structures represents examples of corresponding acts for implementing the functions described in such steps.

According to this illustrative embodiment of the present invention, a distantly located personal trainer performing an exercise on one treadmill in real-time may control one or more operating parameters of an exercise device used by a user performing an exercise program. However, it may be appreciated that the systems, methods, and devices of the present invention may be implemented and utilized in various other situations and with various other exercise devices or other devices unrelated to exercise devices. The systems and methods of the present invention may be implemented using a variety of hardware and/or software modules and include a variety of computer network configurations, including but not limited to multiple computers and/or exercise devices that are connected via the Internet, LANs, WANs, and the like.

To more easily explain the function and structures of system **250**, reference will now be made to FIG. **10** that is a block diagram illustrating one embodiment of the present invention. As shown, system **250**, that is similar to system **10**, includes a number of user modules **252***a*-**252***n* that represent, in this embodiment, multiple exercise devices, translator devices **13**, and/or computers **14**, whether such exercise devices, translator devices **13**, and/or computers **14** are located in the same area, or distantly located one with another, such as at a number of user's homes. Alternatively, as discussed earlier, user modules **252***a*-**252***n* may take the form of various other devices known by one skilled in the art. For example, the exercise devices may include treadmill **12**, ellipticals, cycles, steppers, hikers, climbers, Nordic type exercise devices, and other various types of exercise devices as known by one skilled in art.

Generally, user modules **252***a*-**252***n* include one or more exercise mechanisms with one or more moveable elements that enable a user to exercise during an exercise program, whether such exercise program requires anaerobic exercise, aerobic exercise, or a combination thereof. Therefore, the modules of each user module **252***a*-**252***n* may be structures capable of performing the functions of: (1) control means for receiving one or more packetized controls signals from the communication system (communication module) indicative of a selected exercise program and changing one or more operating parameters of the exercise mechanism based upon the selected exercise program and the packetized controls signals; (2) interface means, communicating with the exercise mechanism, for gathering a first real-time signal from the user; (3) communicating means, communicating with the interface means, for receiving a packetized second signal, and optionally, for enabling transmission of the first signal; (4) means for reproducing the second signal; (5) means for controlling the operating parameters of the exercise mechanism; (6) means for decoding the control signals; and (7) means for driving the moveable element in response to the decoded control signals.

In one embodiment, user modules **252***a*-**252***n* communicate with a communication module **254**, via network **16**. In one embodiment, communication module **254** has a similar configuration to that of communication system **18** and is capable of transmitting and receiving data from user modules **252***a*-**252***n*. As such, communication module **254** is able to "transceive" information and data to and from the various modules, components, and other hardware and/or software modules of system **250**.

Generally, in one illustrative embodiment, communication module **254** is configured to act as an intermediary module between user modules **252***a*-**252***n* and the various other modules of system **250**. Communication module **254**, therefore, enables user modules **252***a*-**252***n* to communicate with and select one or more exercise programs, whether based on a

live-on-live request or recorded exercise programs. The structures and functions related to communication module **254** will be discussed in greater detail hereinafter.

Optionally communicating with communication module **254** is one or more trainer modules **256***a*-**256***n*. As illustrated, communication module **254** is directly communicating with trainer modules **256***a*-**256***n*. Alternatively, trainer modules **256***a*-**256***n* may communicate with user modules **252***a*-**252***n* through network **16**, therefore enabling user modules **252***a*-**252***n* to communicate with trainer modules **256***a*-**256***n* through network **16** without interacting with communication module **254**, such as illustrated in FIG. **1**, where a user treadmill **12** may communicate directly with a trainer treadmill **20**.

Trainer modules **256***a*-**256***n*, in one illustrative embodiment, include the structures and functions of treadmill **20**. Generally, trainer modules **256***a*-**256***n* include one or more exercise mechanisms with one or more moveable elements that enable an individual to exercise during and exercise program, whether such exercise program requires anaerobic exercise, aerobic exercise, or a combination thereof. Additionally, trainer modules **256***a*-**256***n* are configured to enable a trainer, whether a physical therapist, personal trainer, or the like to perform an exercise program substantially simultaneously with or without substantial delay with users exercising through user modules **252***a*-**252***n*. Furthermore, trainer modules **256***a*-**256***n* may include hardware and/or software modules, and components that enable trainer modules **256***a*-**256***n* to control the exercise devices incorporated within user module **252***a*-**252***n*, such as treadmill **12**. As such, trainer module **256***a*-**256***n* may include various exercise devices commonly known by one skilled in the art, and various hardware and/or software modules that enable the trainer to vary each user module **252***a*-**252***n*, whether individually, collectively, or subsets of the entire group of user modules **252***a*-**252***n*.

It may be appreciated by one skilled in the art that trainer modules **256***a*-**256***n* may take various other configurations as known by one skilled in the art, in view of the teaching contained herein. For example, although trainer modules **256***a*-**256***n* are depicted herein, trainer modules **256***a*-**256***n* may be substituted for one or more additional user modules **252***a*-**252***n*. Therefore, system **250** may enable multiple users to interact one with another through network **16**, without the capability to control one another. As referenced previously, it may be understood that system **10** may also enable multiple users to interact one with another through network **16**, without the capability to control one another.

Optionally communicating with communication module **254** is a third party control module **258**. Third party control module **258**, in one embodiment, enables some third party such as an additional personal trainer, medical provider, development team, and the like to view the current exercise program, while having the ability to control various operating properties of user modules **252***a*-**252***n* and/or trainer modules **256***a*-**256***n*. For example, in a health club setting, third party control module **258** may take the form of a console operated by an individual who is able to control the operating parameters of one or more exercise devices (e.g., during a spinning class), whether operated by a trainer or user, during an exercise program. It may be appreciated by one skilled in the art that various other configurations of third party control module **258** are applicable and known to one skilled in the art, in view of the teachings contained herein.

Through the illustrative configuration of control system **250** depicted in FIG. **10**, a user performing various exercise activities through user modules **252***a*-**252***n* may communicate with trainers using trainer modules **256***a*-**256***n* in real-time communication. Additionally, one user module **252***a*-**252***n* may communicate with another user module **252***a*-**252***n* without communicating with one of trainer modules **256***a*-**256***n*.

Generally, communication module **254** may act as and take the form of a server, with associated hardware and/or software modules to enable communication between the various modules of the illustrated system **250**. As such, user modules **252***a*-**252***n*, trainer modules **256***a*-**256***n*, and third party control modules **210** may be considered clients of communication module **254**. Alternatively, a separate server or a server network, illustrated in dotted lines and referenced by numeral **260** may communicate with communication module **254**. In such a case, communication module **254** acts as a client. Generally, user modules **252***a*-**252***n*, communication module **254**, trainer modules **256***a*-**256***n*, and third party control **210** may communicate one with another, via various communication line connections as discussed herein and known to one skilled in the art in light of the teaching contained herein.

Reference is now made to FIG. **11**, which is a more detailed schematic diagram of system **250**. For ease of explanation, FIG. **11** only shows one user module **252** and one trainer module **256**; however it may be appreciated by one skilled in the art that a similar discussion may be made for multiple users and trainer modules **252**, **256** respectively.

As shown, in one embodiment, user module **252** includes a user interface **262**. User interface **262** enables a user utilizing the beneficial characteristics of user module **252** to engage and give commands thereto with respect to various operating parameters of user module **252**. For example, user interface **262** may include one or more interface devices as discussed previously, such as one or more audio and video input devices **90**, **92** and one or more audio and video output devices **94**, **96** as described earlier herein. Therefore, user interface **262** enables the user to visually and/or audibly communicate with the trainer manipulating personal trainer module **256**, various other stored programming, or other users. Consequently, user interface **262** may incorporate various structures and functions of treadmill **12**, and more specifically control panel **22**. Furthermore, user interface **262** may incorporate various portions of translator device **13** and computer **14**, such as, but not limited to, monitor **166**, keyboard **160**, mouse **162**, and the like. User interface **262** is one structure capable of performing the function of interface means for gathering a first real-time signal from the user and also means for reproducing the second signal from the trainer.

It may be appreciated by one skilled in the art that user interface **262** and hence the interface means may take various forms or configurations to perform the desired function thereof. For example, user interface **262** and interface means may be a voice activated interface, a touch sensitive interface, an automatic monitoring system, such as a system that monitors heart rate, blood pressure, and the like and various other measurable parameters of user module **252** and a user exercising through user module **252**.

User interface **262**, in one embodiment, communicates with exercise module **264**, such as treadmill **12** or other mechanisms having a movable element. Exercise module **264** includes various hardware and software components that enable an individual to obtain aerobic exercise, anaerobic exercise, combinations thereof, or the like exercise program. For example, in one embodiment exercise module **264** is treadmill **12** with computer **14** and translator device **13**. Alternatively, exercise module **264** is treadmill **12** with components of computer **14** and translator device **13** therein.

It may be appreciated that the various modules related to user module **252** may be incorporated within exercise module

264, or more specifically within treadmill 12 or some other device. In another configuration, exercise module 264 includes a movable element, such as belt 42, that allows the user to exercise. In yet another configuration, exercise module 264 may incorporate the structure and functionality associated with user interface 262 therein.

Communicating with exercise module 264 is a data storage module 266. Data storage module 266, in one embodiment is a database of operating parameters for exercise module 264 with respect to one or more exercise programs. As such, data storage module 266 may be a ASIC chip, programmable ROM, CD-ROM, EEPROM, PCMCIA card, compact flash card, flash bios, dynamic memory, magnetic storage disk, optical storage media, or the like. Additionally, data storage module 266 may be a hierarchal, relational, or other typical database, including related database management systems (not shown). Generally, data storage module 266 contains the necessary data and information to operate exercise module 264 in accordance with a selected program by a user operating user module 252 or alternatively to perform the necessary exercise program designated by the operator of training module 256. Furthermore, data storage module 266 may store programming retrieved from communication module 254 in preparation for activation of exercise module 264 upon a request from a user, communication module 254, or trainer module 256. Data storage module 266 may be incorporated within exercise module 264 such as when user interface 262, exercise module 264, and data storage module 266 are part of treadmill 12, whether or not translator device 13 and/or computer 14 is integrally formed therewith.

Communicating with exercise module 264 is a safety module 268. Safety module 268 optionally communicates with storage module 224. Safety module 268 is intermediate between an interface module 270 and exercise module 264 and controls the data transferred through network 16 from communication module 254. As such, safety module 268 tracks the information delivered from communication module 254 and automatically engages a program stored within data storage module 266 upon disengagement of the connection with communication module 254 through interface module 270, thereby delivering one or more safety signals to exercise module 264. Alternatively, safety module 268 may maintain the operating parameters of exercise module 264 at the same level as before disengagement of user module 252 from communication module 254, thereby sending safety signals that maintain the operating parameters of exercise module 264 at the same level as before interruption of the programming. In yet another configuration, safety module 268 sends one or more safety signals that slowly decrease all the operating parameters of exercise module 264 to either a user defined or communication module 254 defined base level or to zero upon disengagement of user module 252 from communication module 254. As such, safety module 268 may include various hardware and/or software components and modules necessary to perform the desired function, such as, but not limited to, a buffer to store programming received from communication module 254. Therefore, safety module 268 is one example of a safety mechanism that is capable of manipulating the operating parameters of the exercise mechanism in the event that a packetized second control signal is interrupted. As such, safety mechanism may generate one or more safety signals to operate the exercise mechanism, as discussed herein. Safety module 268 is another example of communicating mechanism of the present invention.

Interface module 270, connected to safety module 268, manipulates the information and data transceived through user interface 262, whether such data is to be delivered to exercise module 264 or for delivery to communication module 254 through network 16. As such, interface module 228 performs various operations on the data, such as, but not limited to, encrypting data, decrypting data, buffering data, packetizing data, depacketizing data, and the like. Interface module 270 is one example of a communicating mechanism, communicating with the interface, the communicating mechanism enabling real-time transmission of the first signal to a trainer, the communicating mechanism receiving a packetized second real-time signal. In addition, interface module 270 is an example of a structure capable of performing the function of a communicating means, communicating with the interface means, for receiving a packetized second signal, and optionally, for enabling transmission of the first signal.

It may be appreciated by one skilled in the art that there are various other configurations of interface module 270 and hence communicating means. For example, interface module 270 may facilitate communication of data between one or more users rather than between user module 252 and trainer module 256.

Generally, each of the modules referenced as being included within user module 252 may be integrally formed with treadmill 12 or exercise module 264. Those modules may, alternatively, be added to or installed within an existing exercise device to allow the same to communicate with communication module 254. Therefore, the particular functions of each of the modules referenced within user module 252 may vary depending on the particular characteristics and properties of the exercise device. Similarly, user module 252 may include various other modules that may be appropriate, a as understood and may be identified by one skilled in the art.

User interface 262, safety module 268, data storage module 266, and/or interface module 270 are examples of a controller, responsive to the packetized second real-time signal, configured to control the operating parameters of the exercise mechanism (or exercise module) in real-time. Additionally, such a controller is a structure capable of performing the function of control means, communicating with the exercise mechanism (or exercise module), for receiving one or more packetized control signals from the communication system (or communication module) indicative of the selected exercise program and for changing one or more operating parameters of the exercise mechanism (or exercise module) based upon the selected exercise program and the one or more packetized control signals. It may be appreciated by one skilled in the art that the control means may have various other configurations.

Communicating with user module 252 via network 16 is communication module 254. As shown, communication module 254 includes a communication user interface module 272 that transceives data, such as audio, video, and control signals between user module 252 and communication module 254. Communication user interface module 272 may have various forms, such as, but not limited to, those described herein with respect to interface 190. Additionally, communication user interface module 272 may include various hardware and/or software modules and components to encrypt data, decrypt data, buffer data, packetize data, and depacketize data, and the like.

Communicating with communication user interface module 272 is control module 274 that may have a similar configuration and function to control processor 192 in FIG. 8. Control module 274 performs many of the functions recited with respect to control processor 192, in that control module 274: (1) manipulates the data to be transmitted to user module 252, (2) enables the user to select one of a plurality of different programs, whether such programs are stored or live, such

as those stored in memory **278**, (3) requests the creation of control signals by control signal generation module **282** which may be synchronized with the exercise programs, (4) transmits data between one or more user modules **252**, between a one or more user modules **252** and trainer modules **256** via communication trainer interface module **276**, between one or more user modules **252** and/or third party module **258**, and the like. Additionally, control module **274** may access data that is stored in one or more memory modules: memory **194** and external memory **196**.

Furthermore, control module **274**, may automatically disconnect data communication between user module **252** and communication module **254** when the movable element of exercise module **264** is stopped by the user. For example, in a gym type setting, once an individual connects to communication module **254**, and/or communication system **18**, control module **274** provides access to communication module **254** with associated programming. As a user exercises, control module **274** tracks the active status of the movable element of exercise module **264** to determine whether the user is continually exercising. When the user activates, through user interface **262**, stop/pause button **78** (FIG. **6**), control module **274** disconnects the user from communication module **254**. Furthermore, control module **274** clears the temporary data file stored in storage module **224** of user module **252** and may also clear the temporary data files stored in communication module **254** that relate to the particular user. In this way, control module **274** prepares user module **252** and communication- module **254** for use by subsequent users. Although the above discussion is directed to control module **274**, it may be appreciated by one skilled in the art that control processor **192** may perform the same function with control processor's hardware and/or software modules and components.

Control signal generation module **282** may have a similar configuration to that of control signal generator **200** (FIG. **8**), so long as control signal generation module **282** is capable of creating one or more control signals that may be synchronized with the audio and video signals retrieved from memory **194**, **196** or received through communication trainer interface **276** from trainer module **256**.

Trainer module **256** has substantially the same configuration as that of user module **252**. Therefore, trainer module **256** includes an interface module **284** for transceiving data between trainer module **256** and communication module **254**. Communicating with interface module **284** is an exercise module **286** and optionally a data storage module **288**. Furthermore, trainer module **256** includes a trainer interface **290** that enables a trainer to input various exercise parameters to change the operating parameters of user module **252**. Trainer interface **290**, therefore, may include the various input devices recited previously with respect to user module **252** and/or treadmill **12**.

Trainer module **256** optionally includes a control signal generation module **292**. Control signal generation module **292** enables trainer module **256** to generate control signals that are synchronized with the audio and/or video signals that are transmitted from trainer module **256** to user module **252**. Control signal generation module **292**, therefore, is substantially the same as control signal generation module **282**.

The synchronization of the audio and/or video signals with the control signals may be achieved in a variety of different manners. For example, in one embodiment of such synchronization, the audio and/or video signals indicate that the treadmill speed will move from 1 mile per hour to 5 miles per hour. The control signal may not automatically move the speed to 5 miles per hour, but may instead ramp gradually from 1 mile per hour to 5 miles per hour. Optionally, the control signal and video/audio signals are synchronized such that a message increasing to a given speed is instantaneously matched by the exercise device.

Following hereinafter is a discussion of the various optional modules that may be incorporated within communication module **254**, in addition to those discussed earlier. It may be appreciated by one skilled in the art, that communication module **254** includes the typical user interfaces and communication interfaces for enabling user module **252***a*-**252***n* to communicate with training module **256***a*-**256***n* and optionally another user module **252***a*-**252***n*. Generally, therefore, communication module **254** includes various other functional modules. Additionally, the following discussion describes various functions of communication system **18** and its interaction with a user at treadmill **12**, computer **14**, translator **13**, third party **21**, and/or a trainer at treadmill **20**

As shown in FIG. **12**, communication module **254** (FIG. **11**) includes, in one embodiment, an iFit.com website **300** that acts as both an interface with the user, while also controlling the operation of user module **252***a*-**252***n* and/or trainer module **256***a*-**256***n*. As such, iFit.com website **300** is in communication with a number of various other modules forming one embodiment of communication module **254**. Each module depicted may represent functionality included within communication module **254**, while representing structural hardware and/or software modules that may either be incorporated within the hardware and software modules of iFit.com website **300**, or alternatively, accessible by the hardware and software modules forming iFit.com website **300**.

Generally, the iFit.com website **300** is hosted on one or more computers, whether a general-purpose or special-purpose computer, that may have the form of computer **14**, or any variation thereof known by one skilled in the art in view of the teaching contained herein. As such, the hardware and software modules forming iFit.com website **300** may include those listed herein with reference to computer **14**. As depicted in the illustrative configuration of FIG. **12**, iFit.com website **300** may include login-registration module **302**, audio program module **304**, video program module **306**, health information module **308**, consumer purchase module **310**, personal training module **312**, competition module **314**, diagnostic module **318**, program generation module **318**, advertising module **320**, and links module **322**.

According to one aspect of the present invention, communication module **254** includes a login-registration module **302** that is accessible via iFit.com website **300**. Login-registration module **302** is configured to obtain the necessary registration and login information from a user wishing to use communication module **254** and the various audio/video and literary information contained therein, with their exercise device.

Referring now to FIG. **13**, a flow diagram illustrating the operation of login-registration module **302** is depicted. Initially, login-registration module **302** identifies whether the user has logged into the communication module **254** before, as represented by decision block **330**. In the event that the user is accessing or "logging in" to iFit.com website **300** for the first time, login-registration module **302** gathers the user information, as shown by block **332**. Specifically, login-registration module **302** may gather the user's name, age, sex, type of exercise equipment being used, and various other data unique to the user. Additionally, login-registration module **302** may present the user with multiple questions to obtain statistical information regarding the user's background, education, work experience, income, hobbies, and other related information to aid operators of communication module **254** and system **250** in providing greater instructional information

to the user. Furthermore, such statistical information may also be used in targeting specific advertisement to the individual during an exercise program.

As information is gathered from the user, payment information, such as credit card numbers, accounts, and the like may further be obtained from the user. Alternatively, as depicted in FIG. **12**, the step of obtaining payment information may follow the gathering of the user information, as shown by block **334**. Once all the necessary information is gathered, login-registration module **302** assists the user in defining a login user identification number (user ID) and password that are unique to the particular user, as depicted by block **336**. Upon defining the user password and user ID communication module **254** stores the information within a memory of communication module **254** and optionally user module **252**. The user is subsequently asked to login to communication module **254**.

Following the logging in procedure, the user is given access, as depicted by block **340**, to communication module **254** to the specific level that they are allowed, based upon their responses to the various questions asked during the login procedure. For example, if a user defines the exercise device as a treadmill located at home, the user may be limited to only the treadmill related web pages of iFit.com website **300**. Similarly, if a user does not define any account information the user may be limited to only the free web pages and information available thereon, while being restricted to access the fee-based web pages, such as to purchase exercise profiles, exercise equipment, and the like.

Referring again to decision block **330**, if a user accesses communication module **254** for a second or any other subsequent times, decision block **330** is in the negative, and login-registration module **302** gathers the user ID and password from the user, as depicted by block **342**. Upon gathering the user ID and password, login-registration module **302** verifies the user ID and password with the stored user ID and password, as represented by block **344**. Subsequently, login-registration module **302** either rejects access to communication module **254** or alternatively allows access thereto with the specific level of access, as shown by blocks **346** and **340**.

It may be appreciated by one skilled in the art, that various other functionality and structures might form login module **302**. For example, login-registration module **302** may incorporate various processors, micro-controllers, logic circuits, and the like to analyze and store the information input during a login process. In one configuration, login-registration module **302** may communicate with user module **252** during the login process to verify that the exercise device used by the user is the same as previously indicated by the user during previous logins. In the event that the exercise device differs, whether by type, model or the like, login-registration module **302** may cause communication module **254** to either prompt the user to change the stored login information, thereby varying the access to the various programs, or automatically change the login information and associated access in light of the changed exercise device.

In another configuration, login-registration module **302** may be a separate hardware and/or software module or component that is located distantly from the hardware and/or software components or modules of communication module **254**. In still other configurations, login-registration module **302** may be further adapted to store information regarding the use of exercise equipment. For example, login-registration module **302** or some other module of communication module **254** may track the amount of time that a user spends exercising on a particular type of exercise device, thereby determining a user's exercising preferences.

Furthermore, login-registration module **302** may track the particular locations where the user trains to identify a user profile of the user's exercise activities throughout the United States of America or the World. Such information may then be used to provide the user with specific information related to those locations where the user exercises most. For example, the user may receive targeted advertising to exercise and non-exercise related businesses or services within the city or state of the place where the individual commonly visits or exercises.

Referring back to FIG. **12** communication module **254** includes an audio program module **304**. Generally, audio program module **304** is configured to provide the user with multiple selections of audio programs that are available for particular types of exercise devices. Additionally, audio program module **304** allows the user to purchase copies of the audio programs that may be performed on line.

As depicted in FIG. **14**, audio program module **304** allows the user to select from various types of exercise devices with associated audio programs. As illustrated, audio programs may have separate information for treadmills, ellipticals, cycles, steppers, hikers, climbers, Nordic type exercise devices, and various other types of exercise devices known by one skilled in the art. As such, a user may manually select the particular exercise device to be used. Alternatively, audio program module **304** may dynamically select the particular exercise device and the various audio programs applicable to the user's exercise device by analyzing the user information gathered by login-registration module **302**. No matter the manner by which the particular exercise device is selected, FIG. **15** depicts an illustrative flow diagram that depicts possible user selections and data flow related to accessing the one or more audio programs available through communication system **18**, and more specifically iFit.com website **300**.

As shown, upon selecting a particular exercise device (whether manually or dynamically as discussed above), as depicted by block **350**, the user is allowed to select the type of music to be played during the program session, as depicted by block **352**. Once the user has selected the particular music type, the user is given the option to view the program information to determine if the difficulty level is too great, as depicted by decision block **354**. For example, if the individual wishes to view the exercise program profile, communication module **254** packetizes an audio and/or graphical representation of the exercise program selected (i.e., the maximum speed, maximum incline, time to perform the exercise program, amount of time at each maximum speed and incline, and various other operating parameters known to one skilled in the art) and transmits the data to either the integrally formed video output device **92** (FIGS. **1** and **6**) mounted on treadmill **12**, or alternatively, to monitor **166** (FIG. **7**) associated with computer **14** for review by the user, as depicted by block **356**.

Alternatively, the user may decide not to view the user profile, such that the response to decision block **354** is in the negative. Whether or not the user views the exercise profile, the user may select to begin the online exercise program, as depicted by decision block **358**. If the user selects in the affirmative, communication module **254** delivers the audio signals, with control signals, to user module **252** in accordance with the selection. Consequently, communication module **254** may download the entire audio program to user module **252**, or alternatively "stream" the audio signals thereto by a manner known by one skilled in the art. Upon completion of the program, as depicted by block **360**, the user is given the opportunity to purchase their own copy of the audio program just performed, as represented by decision

block **364**. In the event they decline to purchase the program session, the particular audio program session is completed and the user is optionally returned to the homepage of iFit-.com website **300**.

Referring again to decision block **358**, if the user selects not to perform the online program, the user may optionally select to purchase the program, as depicted by decision block **364**. If this selection is in the negative, the user is returned to the homepage of iFit.com website **300**. Otherwise, if the user wishes to purchase the program, audio program module **302** gathers account information, as depicted by block **366** and media format, such as CD, tape, MP3 file, or the like, as depicted by block **368**. Furthermore, audio program module **304**, through video output device **90** or monitor **166** displays the pricing guides for various types of media and/or associated mailing costs, as depicted by block **370**. Alternatively, audio program module **304** may interface with an accounting module that performs the function of storing and collecting account information and purchase information from any of the various modules associated with communication module **254**. As such, communication module **254** may have a centralized accounting module that is accessible by one or more of the various modules forming communication module **254**. Furthermore, in another alternate configuration, audio program module **304** may communicate with login-registration module **304** and obtain account information therefrom.

Referring again to FIG. **12**, communication module **254** further includes video program module **306**. Video program module **306** uses a similar flow of information and related functional operations as audio program module **302**; however, video program module **306** merely gives video options to the user, whether such video options include or exclude audio programs transposed or incorporated therein. Therefore, instead of selecting a music type, video program module **306** enables a user to select a video program session and receive real-time or streamed video and/or audio signals. Similarly, in the event the user wishes to purchase the video program, video program module **306** enables the user to select a particular type of video format such as CD ROM, DVD, video tape, MP3 file, and the like.

According to another aspect of the present invention, communication module **254** includes a health information module **308**. Health information module **308**, in one embodiment, includes a searchable database of information related to health issues for those exercising and/or those who wish to begin to exercise using communication module **254**. As such, in one configuration, health information module **308** is a distantly located database, such as a relational, hierarchal, or some other database that is accessible by the iFit.com website **300**. Alternatively, health information module **308** may be incorporated within the hardware and/or software components and modules hosting iFit.com website **300**.

Communication module **254** may optionally include a consumer purchase module **310**. Consumer purchase module **310** is configured to enable a user to purchase exercise equipment, materials such as books and instructional materials, nutritional supplements, and the like online. Consumer purchase module **310** may, therefore, link directly to one or more affiliates of communication module **254**. Alternatively, consumer purchase module **310** may include a database, whether relational, hierarchal, or the like that has stored specifications, pricing guides, illustrative images of exercise devices and products, and the like, that a user may search through to find the necessary or desired exercise equipment. Additionally, consumer purchase module **310** may include the necessary hardware and/or software modules to gather and store billing and purchase information from the user or alternatively, consumer purchase module **310** may communicate with a centralized accounting module that performs the necessary functions typically known by one skilled in the art related to accounting, billing, purchasing, sales, and the like activities.

According to another aspect of the present invention, communication module **254** includes a personal training module **312**. Personal training module **312** enables a user to interact with a personal trainer on a live-on-live exercise session whether in a one on one session or in a group setting. Additionally, personal trainer module **312** enables the user to ask questions and receive communications from one or more personal trainers related to exercise advice, techniques, and programs, whether or not in real-time.

Referring now to FIG. **16**, a schematic representation of the various illustrative functional modules of personal training module **312** are illustrated. As shown, personal training module **312** includes a scheduling module **380** that enables various individuals to schedule times to talk to and optionally perform a live workout program. Scheduling module **380** enables the user to access a profile module **382** that contains one or more trainer profiles. In this way, personal training module **312** enables a user to review the profiles of the various trainers to select the particular trainer that best suits the user's needs and/or time requirements. Profile module **382** may, therefore, include a database, whether relational, hierarchical, or the like, or some other data storage hardware and/or software that is capable of storing data in an accessible form.

Scheduling module **380**, in one embodiment, communicates with a calendaring module **384** that lists the days of the month and the particular times available for one-on-one exercise programs with each trainer. Additionally, calendaring module **384** may list the times of group sessions and enable a user to select a particular session time reference within calendaring module **384** for the user to exercise with a personal trainer.

As shown, scheduling module **380** may communicate with a mailbox module **386** that includes multiple mailboxes, one for each user and trainer. Each mailbox may receive email from trainers and other users of communication module **254**, or alternatively, only trainers or communication module **254** may deliver a message **388** to each user, such as electronic mail. Generally, each mailbox is configured to receive messages from the trainers regarding scheduled one-on-one exercise sessions or group sessions. Additionally, communication module **254** or iFit.com website **300** may deliver notifications of upcoming special group exercise sessions, or other information related to the user and/or exercising. Each user and/or trainer may save unique exercise programs created by the user and/or the trainer within data storage **390** accessible by mailbox module **386**. Optionally, data storage **390** may correspond to memory **278** (FIG. **11**) or other external memory that is accessible to mailbox module **386**.

Communicating with personal training module **312** is a video conferencing module **392**. Video conferencing module **392** provides the functional hardware and/or software to allow a user to videoconference with a personal trainer. For example, video conferencing module **392** may include various hardware and/or software modules that: (1) assist with data transmission of audio and/or video signals between user module **252***a*-**252***n* and trainer module **256***a*-**256***n*; (2) assist with image and voice capturing; (3) packetizing or depacketizing data, and the like, such as those discussed with respect to system **10**, or otherwise known to those skilled in the art in light of the teaching contained herein. Additionally, video conferencing module **392** allows the user to videoconference with the personal trainer in either a private room, as represented by numeral **394** or in a public room, as represented by

numeral **396**. In either case, (i.e., in the private or public room) the user may exercise with the personal trainer in a one-on-one or group setting.

It may be appreciated by one skilled in the art, that the functionality described herein with respect to personal training module **312** may be varied and is only illustrative of one possible embodiment thereof. Other functionality and associated structures such as hardware and/or software modules may be included within personal trainer module **312**. Furthermore, various other linkages may occur between the various functional modules of personal training module **312**. For example, in one alternate embodiment, calendaring module **384** is linked with private room **394** such that upon scheduling a one-on-one exercise program, a private room is automatically scheduled for the user. Additionally, calendaring module **384** may automatically send a message to the user's mailbox, thereby providing the user with information regarding the particular private room scheduled and a reminder of the schedule time.

According to another aspect of the present invention, as illustrated in FIG. **12**, iFit.com website **300** includes a competition module **314**. Competition module **314** enables one or more individuals to engage in competitive exercise programming with one another or alternatively with the communication module **254** hosting iFit.com website **300**. Such competitive exercise programming motivates the users to exercise on a more regular basis while also setting goals for the individual to reach. Competition module **314**, therefore, provides various benefits to those seeking to exercise on a regular basis.

Referring now to FIGS. **17**A-**17**D, a flow diagram representing one illustrative operation of competition module **314** is depicted. As shown, a user selects the particular race types that they wish to engage in, as depicted by block **400**. Three types of races are depicted; race around the world **402**, race against the computer **404**, and personalized race **406**; however various other race types are applicable and known to one skilled in the art, in view of the teaching contained herein.

One particular race type is a race around the world. In the race around the world type race, an individual races against various other individuals to determine who will run around the world in the shortest time. Communication module **254** tracks the exercising activities of competing users of user modules **252***a*-**252***b* and computes the distance traveled per exercise session and per user. A running total of the distance traveled is maintained and updated. Each competitor may compare the total distance traveled against other competitors to see who runs a number of miles equivalent to running around the world in the shortest time.

With reference to FIG. **17**A, when the race around the world race type is selected, competition module **314** retrieves the stored statistical information of the user, as depicted by block **410**. The statistical information may include, but is not limited to, distance traveled by the user, average speed of the user, and the like. Once competition module **314** selects the stored statistical information, such information may be compared against other competitors in the race, as depicted by block **412**. Competition module **314** may deliver comparison data to communication module **254**. In turn, communication module **254** may deliver a graphical representation of the user's exercise distance, times, speed, and other information compared against other competitors to the user via user module **252***a*-**252***n*. A user module **252***a*-**252***n* or a user operating treadmill **12**, for example, may view their distance and times with respect to other competing users of user modules **252***a*-**252***n*, thereby being motivated to exercise more. Once such information is depicted, the user may modify their existing exercise programs to either increase or decrease exercise parameters of the programs. For example, if the user sees that they have not run as many miles as other competitors, they may increase the distance to be run in the future. Once the user is ready, the user may begin or continue the race, as represented by block **414**. As the user exercises communication module **254** records new statistical information for the user, such as speed, distance traveled, calories used, and the like.

It may be appreciated by one skilled in the art that various other configurations of the race around the world type race are applicable and known to one skilled in the art. For example, in another configuration of the race around the world type race, a user may select a particular time period, say from January 1 to February 1, and race against others to see who travels the furthest distance within the given time period. Again, communication module **254** tracks the distance traveled of each competitor and may provide graphical representations of the position of one competitor against the other competitors. In still yet another configuration, the race around the world may include racing over various types of terrain ranging from deserts, mountains, and the like. As such, each competitor follows a similar overall exercise profile and communication module **254** tracks the time that a user takes to complete the race, for example, when a user slows down the treadmill based upon the terrain traversed.

Referring again to FIG. **17**A, the user may optionally select to race against the computer, as referenced by block **404**. As the name of the race type suggests, this option enables the user to select a particular type of race and a particular skill level of the computer against which to race. As shown in FIG. **17**C, a user selects the difficulty level for the particular race, as represented by block **416**, such as in the case of a treadmill, the speed, incline, distance, and the like. This may also enable the user to select a particular skill level of the computer, such as a beginner runner, intermediate runner, or advanced runner. Additionally, the user may select various other options, as represented by block **418**, such as a head start for the computer or the user, scaling of the particular difficulty level, and the like. Upon completing the selections, the user may race against the computer, as represented by block **420**.

With reference to FIG. **17**A, another type of race is a personalized race, as depicted by block **406**. In the personalized race, two or more individuals schedule a live on live session, such as in a private room of personal training module **312** where they may race one against the other, while viewing graphical representations of the distance, time, and speed of the other competitors. Alternatively, two or more individuals may schedule a race where the start time is adjusted based upon the particular location of the competitors.

As shown in FIG. **17**D, a user may select a time-adjusted race, as depicted by decision block **422**. If the user rejects time adjustment, then the user will race against one or more competitors in a live-on-live competition. The user selects one or more competitors, as referenced by block **424**. Following the selection, each competitor enters a private room to begin the race and to synchronize each competitor's exercise device with communication module **254** and each other, as depicted by block **426**. Alternatively, each competitor may merely enter the private room that has been scheduled for the race, thereby automatically selecting each competitor for the race, while synchronizing each competitor's exercise device in block **426** in preparation for beginning the race as depicted by block **428**.

Synchronization prepares the communication links between each competitor and generates the displays and data flow therebetween, such as, but not limited to, the audio and video data flows and displays that enable each competitor to view their progress against each other. For example, the dis-

play may include a racing track that shows a relative position of each competitor one with another, or a trail that each competitor races along. It may be appreciated that various other data flows and displays are appropriate and known to one skilled in the art in view of the teaching contained herein.

As suggested above, the user may select a time-adjusted race. The time-adjusted race allows two or more competitors to conveniently race against each other. For example, the time-adjusted race allows an individual on the east coast to race against individuals in the Mountain Time zone and the west coast at the same local time, for example 5:00 p.m. The time-adjusted race, therefore, stores the race of one individual, say the individual on the east coast who races at 5:00 p.m. and then rebroadcasts the stored exercise race to those other individuals in various other time zones upon reaching the designated time period, such as 5:00 p.m. Mountain Standard Time, pacific time, and the like.

With reference to FIG. **17**D, for ease of explanation, let us assume that three individuals, one on the east coast, one in the Mountain Time zone, and one on the west coast wish to race against each other at 5:00 pm local time. Each competitor accesses communication module **254** and selects each other as competitors, block **430**, in a time-adjusted race, as depicted in decision block **422**. Each competitor defines the particular time period or adjusted time at which each individual is to race, as depicted by block **432**. The selections and adjusted times for each competitor are stored in one or more databases or other storage modules associated with an identification number given to the time-adjusted race or directly to each competitor. Once the information is entered and stored, the competitor on the east coast may perform their race on their own or with the aid of a pace setter generated by the computer at the appointed time, as depicted by block **434**. Once the east coast competitor finishes their race, the statistical information and a real-time representation of the race is stored, as represented by block **436**. Upon the arrival of the adjusted time for the Mountain Time zone competitor to race, communication module **254** will rebroadcast the particular race performed by the east coast competitor to the Mountain Time zone competitor. Similarly, upon the time for the west coast competitor to race, communication module **254** will rebroadcast the particular race performed by the east coast competitor and optionally the Mountain Time zone competitor to the west coast competitor. It may be appreciated by one skilled in the art that the live on live and time-adjusted races may be performed in a variety of different manners. For example, the number of competitors is not limited to any specific number. Additionally, the time adjustments may allow for competitors throughout the world to race one against another.

It may be appreciated by one skilled in the art that competition module **314** may have various other configurations. For example, the functionality of competition module **314** may be incorporated within user modules **252***a*-**252***n*. As such, two or more user modules **252***a*-**252***n* may be in direct communication one with another, without the aid of communication module **254**, and the internal modules of user modules **252***a*-**252***n* enable competition data to be transceived between the user modules **252***a*-**252***n*.

With reference again to FIG. **12**, communication module **254** further includes a diagnostic module **316**. Diagnostic module **316** enables the user to perform a diagnostic analysis of their particular exercise device or product in the case of disconnection or changes in the operation of their exercise device or product. Additionally, diagnostic module **316** enables the user to update and change operational parameters of the user's exercise device or product, either through manual activation of diagnostic control **88** (FIG. **6**) or automatically through communication module **254**. For example, in the event a new software update is available for the particular exercise device's software, communication module **254** may automatically recognize operation of the update and deliver the same to each individual having an exercise device or product that may benefit from updating of the software. Additionally, the diagnostic module **316** may identify problems with the exercise device and subsequently schedule arrival times for maintenance workers to resolve physical problems that are unable to be fixed by remote communication from communication module **254**.

As such, referring now to FIG. **18**, an illustrative flow diagram representing diagnostic module **316** is depicted. As shown, a user is asked to select whether they wish to update their product, as depicted by decision block **440**. Alternatively, communication module **254** may automatically recognize that the exercise device or product is to be updated, therefore eliminating block **440** from the flow diagram. In the event that the user wishes to update the exercise device or product, communication module **254**, and more specifically diagnostic module **316**, connects directly to user module **252***a*-**252***n* via network **16** (FIGS. **1** and **10**), as depicted by block **442**. Such connection may be achieved by a variety of manners, as known by one skilled in the art and also discussed herein. Upon connecting to user module **252***a*-**252***n* or product, diagnostic module **316** verifies that particular hardware and/or software modules are contained therein, as shown by block **444**. In the event that software or read/write hardware may be updated, the necessary executable file is either streamed or downloaded to user module **252***a*-**252***n*, as referenced by block **446**. Upon receiving the downloadable file, user module **252***a*-**252***n* executes the executable file to update the hardware and/or software components therein, as referenced by block **448**. Alternatively, such as in system **10** (FIG. **1**), the downloadable file may be downloaded to computer **14** which may execute the program and update treadmill **12** remotely.

Referring again to decision block **440**, when the user answers in the negative, the user is subsequently queried as to whether they are having difficulty with their exercise device or product, as identified by decision block **450**. Upon answering in the affirmative, diagnostic module **316** queries the user, as depicted by block **452**, as to the difficulties they are having and what attempts if any, they have made to resolve the problem. Upon gathering the necessary information, diagnostic module **316** connects to the exercise device or other device, as depicted by block **454**, and thereafter analyzes the various hardware and software problems to resolve and identify whether it is possible to remotely fix the problem, as depicted by blocks **456** and **458**. In the event that the exercise device or product may be remotely corrected, through an update, as depicted by decision block **460**, diagnostic module **316** will then perform the steps of updating as previously described in block **442**, **444**, **446**, and **448**. Alternatively, if the problem may not be corrected through remote access, diagnostic module **316** may automatically schedule a time for physical maintenance of the device or product. It may be appreciated by one skilled in the art, that various other functionality may be performed by diagnostic module **316**.

In an alternate configuration, when user module **252** (FIG. **10**) is placed in the active status (e.g. turned on) user module **252** may optionally analyze its internal hardware and/or software modules to verify that such modules are operating correctly. In the event that one or more problems occur, diagnostic module **316** answers decision block **440** in the affirmative, thereby automatically obtaining an update from communication module **254** (FIG. **10**) or alternatively manually request-

ing information from the user. Optionally, when a user of user module **252** accesses communication module **254** (FIG. **10**), communication module **254** activates diagnostic module **316** (FIG. **12**) to analyze user module **252**.

Referring again to FIG. **12**, according to another aspect of the present invention, communication module **254** enables a user to prepare a personalized audio and/or video exercise program. Communication module **254**, therefore, includes program creation module **318**. Program creation module **318**, referring now to FIG. **19**, enables a user to select an audio program session, as depicted by decision block **470** and/or a video program session, as depicted by decision block **478**. In the event that only an audio program session is desired, the user initially selects the type of exercise device that the program is to be used, such as, but not limited to, treadmills, cycles, steppers, hikers, climbers, Nordic style devices, ellipticals, and the like, as represented by block **472**. Upon selecting the type of device, the user may then select a specific type of music, such as rock, pop, country, jazz, classical, alternative, or the like, that is to be used with the exercise program, as represented by block **474**. Once a particular music type is selected, the user may then generate an exercise profile that the exercise device will follow during the exercise program, as depicted by block **476**. Generation of the exercise profile may include defining one or more operating parameters of the exercise device, such as the speed and inclination of the tread base for a given period of time. Upon finalizing the exercise program, the user may then store the program, as represented by block **488**, such as in their mailbox, on their exercise device, on a computer readable media, or the like.

In the case of a video program, the user again selects the particular type of exercise device to be used in association with the exercise programming, as represented by block **480**. Upon selecting the exercise device, the user may select a particular video presentation they desire, as represented by block **482**. The video presentation includes any type of motivational programming known to those skilled in the art. For example, and not by way of limitation, the video presentation may include natural scenes, such as mountains, oceans, streams, and the like, exercising individuals, educational programming, abstract images, and the like. It is preferred that each video presentation includes a specific sound track; however, the user may modify a particular audio track that is synchronized with the video presentation or optionally generate a completely new audio track, according to block **484**. Once the video program, and optional music program, is selected, the user may subsequently generate an exercise profile, as represented by block **486**, in a similar manner to that described above. As with the audio program, the video program may be stored for use at subsequent times, as depicted by block **488**.

The presently described invention may be used in a variety of situations to enable individuals who wish to exercise to obtain more beneficial results in a highly motivated setting. With this in mind, following hereinafter is an illustrative embodiment of an environment within which the exercise devices and modules of the presently described invention may be used.

Referring again to FIG. **12**, communication module **254** includes an advertising module **320**. Advertising module **320** is adapted to retrieve the information obtained by login-registration module **302** and retrieve from memory **194** or external memory **196** (FIG. **8**) advertisements that may be appropriate for the user to view in light of the selections made during the login process. In one embodiment, an audio and video advertisement signal is delivered with the audio and video exercise programming to appear on user interface **262** (FIG. **11**). For example, a banner may appear on user interface **262** (FIG. **11**), and more specifically video display **94** (FIG. **6**) for the user. Such advertising may, alternatively, take the form of an additional streaming, real-time audio and video output that is linked to one or more national advertising agencies. In such a case, the banner may optionally appear for a few seconds to present a micro-commercial targeted to the user of user module **252**. Upon completing the commercial, the banner may disappear, to subsequently reappear with the same or alternatively different micro commercials at various periods along an exercise program.

Referring again to FIG. **12**, communication module **254** includes a links module **322**. Links module **322** is configured to provide the user with a list of various additional web sites where educational and exercise information, products, materials, and the like may be viewed and/or purchased.

With reference now to FIG. **20**, a master-slave system **500** is depicted that may or may not use the systems described above to enable communication between the various components of the master-slave system as will be described in detail hereinafter. Master-slave system **500** may use various types of networks, such as the Internet to enable communication between the various portions of master-slave system **500**. Master-slave system **500**, in this embodiment, includes a master device **502** and one or more slave devices **504***a*-**504***n* communicating with master device **502**. In this embodiment, master device **502** may take the form of a treadmill with a computer integrally formed therein.

Alternatively, master device **502** may be a treadmill with one or more processors, controllers and memory storage devices that allow master device **502** to control one or more slave devices **504***a*-**504***n* without entirely incorporating a computer therein. Master device **502**, therefore, may or may not incorporate the structure and functionality of treadmill **20** (FIG. **1**) or other exercise devices, communication module **254** (FIG. **10**), and/or trainer modules **256***a*-**256***n* (FIG. **10**).

Generally, master device **502** enables an individual exercising thereupon to control one or more slave devices **504***a*-**504***n*, in real-time, whether or not master device receives input data from the one or more slave devices **504***a*-**504***n*. As depicted, master device **502** is directly linked with each of the slave devices **504***a*-**504***n* via a communication line connection, such as, but not limited to, existing broadcast technology, including short range wireless transmissions, television broadcast over the airwaves, cable or cable modems, satellite, telephone lines, whether analog or digitally based, wireless technology, other high-speed data connections, or any other suitable transmission technology or medium. Master device **502**, therefore, includes the appropriate hardware and/or software applicable to enable master device **502** to communicate and control one or more slave devices **504***a*-**504***n*.

In one case, the internal components of master device **502**, alone, are sufficient to enable communication to and control of slave devices **504***a*-**504***n*. Therefore, master device **502** need not incorporate computer **14** (FIG. **1**), translator device **13** (FIG. **1**), or hardware and/or software modules of communication system **18**, or communication module **254** therein. In another configuration, master device **502** may communicate with slaves **504***a*-**504***n* via a network and a communication system or module so that master-slave system **500** has a similar configuration to system **250** where one or more trainer modules **256***a*-**256***n* control the operation of one or more user modules **252***a*-**252***n* via network **16**, whether or not communication module **254** is used to facilitate such communication and control.

Each slave device **504***a*-**504***n* and sub-slave device **506***a*-**506***n* linked to master device **502** may take the form of an

exercise device, such as treadmill **12**, translator device **13**, and/or computer **14** of FIG. **1**. Additionally, each slave device **504***a*-**504***n* may incorporate the structure and functionality of user modules **252***a*-**252***n*. Each slave device **504***a*-**504***n*, therefore, may be controlled by master device **502** in real-time while enabling the user to manually override the operation of the exercise device in opposition to control signals received from master device **502**.

As illustrated in FIG. **20**, each slave **504***a*-**504***n* may optionally be a master to subsequent sub-slave device **506***a*-**506***n*, as shown in broken lines. In such a manner, various exercise devices may be separated into different groups. For example, slave **504***a* may receive a beginner level control signal from master **502**. In turn, slave **504***a* may control the operation of one or more sub-slave devices **506***a*-**506***n* that are operated by one or more beginners. Similarly, slave **504***b* may receive an intermediate level control signal from master **502** and subsequently control one or more sub-slaves (not shown), while slave **504***n* may receive an advanced level control signal from master **502** and subsequently control one or more sub-slaves (not shown).

According to another alternate configuration, master device **502** may receive information from each slave device **504***a*-**504***n* representative of the user's heart rate, blood pressure, and the like. Master device **502** may, therefore, modify each slave device **504***a*-**504***n* or sub-slave device **506***a*-**506***n*, whether individually or collectively, based upon the data received from the user. For example, if the user's heart rate is too high, master device **502** may automatically reduce one or more operating parameters of the exercise device, such as speed, incline, resistance, and the like.

Although it is preferred that the communications performed according to the present invention (e.g., the first signal and the second signal) be in real-time, it is also possible to achieve many objects of the present invention by engaging in communication other than real-time.

According to one aspect of the present invention, an exercise device is disclosed that incorporates various audio/video features into the device or exercise device itself rather than having external audio/video features connected thereto. The exercise device may also include sensors that track the activity level of an individual on the exercise device, to determine whether a user is actually exercising or to determine whether the user is old enough to be using the exercise device.

According to another aspect of the present invention, one or more users are enabled to exercise in a group setting, while being distantly located one from another. Furthermore, the present invention enables home exercise equipment users to interact with trainers, other users, physical therapists, physicians, and the like in live-on-live workout sessions and, in some situations, allow a trainer, physical therapists, physicians, and the like to control at least one operating parameter of the exercise device upon which the user is training.

To enable the above-described communication, a user may access a communication system or module that facilitates communication between one or more users, trainers, or third parties. Such communication system or module may include at least one web site with associated web pages. As a user accesses the communication system or module, statistical information related to an individual's workout regime, such as how much time an individual spends on each various exercise device, the locations where they trained, when each user accesses the communication system or modules, and the like is gathered.

Generally, the communication system or module, and hence the web site, may enable a user to access information and programming contained therein, while, in one embodiment, the communication system or module has the ability to control at least one operating parameter of the device or exercise device via the web site and web pages. In one case, when a user activates one or more input devices, such as a touch sensitive screen having a visual representation of the web page thereon, the communication system or module, via the web site, changes the operational parameters of the device or exercise device.

Various programming is accessible through the communication system or module. For example, the user may select live or recorded programming. One type of programming or capability of the communication system or module relates to competitive motivational content. Such functionality allows an individual to compare the amount of miles traveled on an exercise device against individuals throughout the world engaging in similar activities. Therefore, competitors around the world may race against one another. Optionally, two or more users may link their exercise devices directly without the need to communicate through the communication system or module.

Another type of motivational content may include one or more electronic magazines or books that a user may download to view while exercising. Yet another type of motivational content or programming relates to the ability of the user to view an exercise profile representative of the exercise program currently being performed by the user. Such a profile may be displayed to the user continuously, periodically, or other under the control of the user and/or the communication system or module. In one configuration, the exercise profile may appear and overlay the visual image that the user is watching, whether the visual image is a television broadcast, webcast, or the like.

Another type of motivational content relates to various advertisements. During the exercise program a user may receive commercial advertising through an advertising banner that may continuously or periodically appear on the video display. Optionally, the advertisement may appear in a picture-in-picture advertisement that is delivered to the user as a micro-commercial that is displayed to the user and subsequently removed.

The programming received from the communication system or module may be live or recorded. In some situations the live programming received by the user may be too difficult or not difficult enough for the user of the exercise device. The present invention provides scaling controls that allow the user to scale the signals received from the communication system or module and/or the trainer. In this manner, the exercising user may increase or decrease the intensity of the exercise program. Such scaling may be achieved either at the user device, trainer device, the communication system or module, or at some other third party modules that may control the operation of the user's exercise device. By selecting a particular option on the web page, the user's appliance will be controlled according to the scaled choice. Optionally, the user may define a maximum limit for one or more of the operating parameters of the device, such that transmitted programming is limited in accordance with the maximum values defined for each operating parameter.

According to another aspect of the present invention, the systems, devices, and modules of the present invention enable bi-directional communication between one or more user devices and one or more trainer devices. The communication system or module of the present invention may retrieve information from the devices and/or exercise devices and evaluate the operating parameters of the device and/or exercise device. The communication system or module may analyze any measurable parameter of the device or exercise device and may

optionally analyze any measurable parameter of a user exercising using the exercise device. In response to this analysis, the communication system or module prescribes a particular action for the device or exercise device to perform, such as changing the speed of a treadmill, inclination of a treadmill, and the like.

According to yet another aspect of the present invention, the exercise device is capable of being controlled by signals from the communication system or module and/or physical controls integrated onto the device or exercise device. The physically integrated controls and the controls from the communication system or module may be passed through a buffer that controls the exercise device or device. In this way, in the event that connectivity to the communication system or module is lost, a user of the device or exercise device would still be capable of controlling the device or exercise device.

According to another aspect of the present invention, communication system or modules may remotely update various portions of a device or exercise device according to the need or direction of the user of the device or as determined by the communication system or module. For example, communication system or module may change any and all parameters related to the device or exercise device, such as the BIOS, or some other software.

According to another aspect of the present invention, the exercise device or device includes a diagnostic button. Upon activation of the diagnostic button, the internal hardware and/or software components of the device or exercise device, solely, or in combination with the communication system or modules tests and checks the various hardware and/or software modules, components, or elements of the device or exercise device. If any problems are found the internal hardware and/or software components of the device or exercise device, solely, or in combination with the communication system or modules attempt to fix the problems. Additionally, the diagnostic button may activate a downloading sequence to update information on the appliance with new software from a central database, such as at communication system or module.

According to another aspect of the present invention, the present invention may includes one or more interfaces that may communicate with existing hardware and/or software components of various existing devices and exercise devices. As such, those devices or exercise devices not currently capable of communicating with communication system or module, may be retrofitted with various hardware and/or software modules as described herein to allow the exercise device or device to communicate with the communication system or module.

As mentioned, the presently described systems, methods, and devices may be used in a master-slave system. In such a system, changes to the operating parameters of the master are translated to the operating parameters of the slave, thereby controlling the operation of the device or exercise device. For example, in a spinner class, upon activation of a more intense riding experience by the master, the slave spinners also give their riders a similarly intense riding experience. The master may selectively choose groups of participants based on various criteria, such as participant's heart rates, and change those participants exercise program, while maintaining other participants at the original or different exercise level.

Embodiments of the present invention are also disclosed in copending U.S. patent applications entitled (i) Computer Systems and Methods for Interaction with Exercise Device, to Scott R. Watterson, William T. Dalebout and Darren C. Ashby, filed Aug. 18, 2000, which is incorporated herein in its entirety by reference; and (ii) Systems and Methods for Interaction with Exercise Device, to Scott R. Watterson, William T. Dalebout and Darren C. Ashby, filed Aug. 18, 2000, which is incorporated herein in its entirety by reference.

As used in this specification and the appended claims, the phrases "communicating with," and "in communication with" and similar phrases shall mean any type of applicable communication known to one skilled in the art in light of the disclosure herein, such as electrical communication, optical communication, physical communication, magnetic communication, software communication, hardware communication, data communication, and the like.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed and desired to be secured by United States Letters Patent is:

1. An exercise device configured to enable a user thereof to interact with a trainer in real-time communication via a communication line, comprising:

(a) an exercise mechanism comprising a movable element for movement in performance of exercise by a user;

(b) a user interface device configured to gather a first real-time signal from the user;

(c) a communication interface cooperating with the user interface device and configured to enable real-time communication of the first real-time signal to the trainer and subsequently receiving a second real-time signal from the trainer through a communication system, the communication system being adapted to generate one or more control signals that are synchronized with the second real-time signal, the first real-time signal, the second real-time signal, and the one or more control signals being packetized for communication through the communication system;

(d) means for reproducing the second real-time signal; and

(e) means, responsive to the one or more control signals, for controlling the operating parameters of the exercise device in real-time, the means for controlling comprising

(i) means for decoding the control signals; and

(ii) means, electrically coupled to the decoding means, for driving the movable element in response to the decoded control signal.

2. An exercise device as recited in claim **1**, wherein the communication system is adapted to facilitate delivery of one or more control signals that are synchronized with the second real-time signal.

3. An exercise device as recited in claim **1**, wherein the second real-time signal comprises programming selected from the group consisting of an audio broadcast, a video broadcast, a combined audio and video broadcast, a webcast, a live broadcast, or a prerecorded broadcast.

4. An exercise device as recited in claim **1**, wherein the second real-time signal comprises programming that is transmitted via a transmission media selected from the group consisting of the air waves, cable, satellite, the internet, radio frequency, wireless, or infra-red.

5. An exercise device as recited in claim **1**, wherein the means for reproducing the second real-time signal is integrated into the exercise device.

6. An exercise device as recited in claim 1, wherein the means for reproducing the second real-time signal is separate and distinct from the exercise device.

7. An exercise device as recited in claim 6, wherein the means for reproducing the second real-time signal comprises an audio output device, a video output device or an audio output device and a video output device.

8. An exercise device as recited in claim 1, wherein the reproducing means comprises a loudspeaker.

9. An exercise device as recited in claim 1, wherein the communication system is remote from the exercise mechanism.

10. An exercise device as recited in claim 9, wherein the interface device gathers the first real-time signal from the user.

11. An exercise device as recited in claim 9, wherein the second real-time signal comprises audio programming, video programming, or a combination of audio and video programming.

12. An exercise device as recited in claim 9, wherein the second real-time signal comprises programming that is transmitted via a communication line.

13. An exercise device as recited in claim 12, wherein the communication line comprises a transmission media selected from the group consisting of the air waves, cable, satellite, the internet, radio frequency, wireless, or infra-red.

14. An exercise device as recited in claim 1, wherein the second real-time signal comprises programming selected from the group consisting of an audio broadcast, a video broadcast, a combined audio and video broadcast, a webcast, a live broadcast, or a prerecorded broadcast.

15. An exercise device as recited in claim 1, wherein the second real-time signal comprises programming that is transmitted via a transmission media selected from the group consisting of the air waves, cable, satellite, the internet, radio frequency, wireless, or infra-red.

16. An exercise device as recited in claim 1, wherein the means for reproducing the second real-time signal is integrated into the exercise device.

17. An exercise device as recited in claim 16, wherein the means for reproducing the second real-time signal comprises a television.

18. An exercise device as recited in claim 16, wherein the means for reproducing the second real-time signal comprises an audio output device and a video output device.

19. An exercise device as recited in claim 1, wherein the means for reproducing the second real-time signal is separate and distinct from the exercise device.

20. An exercise device as recited in claim 1, wherein the reproducing means comprises a loudspeaker.

21. An exercise device as recited in claim 1, wherein the reproducing means comprises an RF transmitter configured to transmit the second signal to an output device.

22. An exercise device as recited in claim 1, wherein the reproducing means comprises an infrared transmitter configured to transmit the second signal to an output device.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,455,622 B2
APPLICATION NO. : 11/429858
DATED : November 25, 2008
INVENTOR(S) : Watterson et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Drawings

Sheet 2, please replace the current drawing of FIG. 2 with the figure depicted below in which "cross member 32" has been correctly labeled

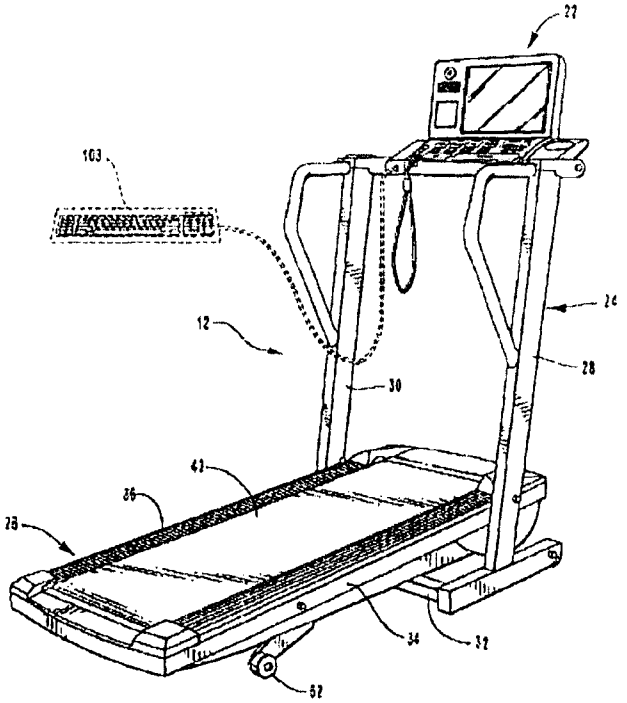

FIG. 2

Column 1

Line 53, change "stationery" to --stationary--

Column 3

Line 7, change "is" to --are--

Line 48, change "according" to --according to--

Column 5

Line 35, change "15 a" to --15 is a--

Line 38, change "16 a" to --16 is a--

Column 11
Line 22, change "be" to --by--

Column 12
Line 60, change "maybe" to --may be--

Column 17
Line 23, change "switching. protocols" to --switching protocols--
Line 55, change "one more" to --one or more--

Column 20
Line 23, change "within," to --within--

Column 21
Line 14, change "signals" to --signals are--
Line 26, change "onto" to --on to--

Column 23
Line 23, change "scaling controls 84" to --scaling controls 86--

Column 32
Line 30, after "appropriate," delete "a"

Column 34
Line 43, change "diagnostic module 318" to --diagnostic module 316--

Column 44
Line 2, change "specifically" to --specifically on--

Column 47
Line 41, change "includes" to --include--

Signed and Sealed this

Ninth Day of March, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office